TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

Vol. 20.] 1923. [No. 2.

MEDICAL HELMINTHOLOGY: A REVIEW.—PART II.*

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PLATYHELMIA—CESTODA.

Taenia.

Taenia solium is apparently now an uncommon parasite. The early statistics of its incidence are misleading, as they include *T. saginata*, which remained unrecognized as a distinct and valid species until the middle of the nineteenth century. BETTENCOURT (1913) studied its occurrence in Portugal, where it is much commoner than in any other country; and he found that 63 per cent. of the Taenias received by him from colleagues in Lisbon and the provinces were of this species.

Taenia saginata was found by DUPONT (1917) to be the cause of a reflex laryngeal spasm lasting some days and giving rise to almost fatal asphyxia. CHRISTOPHERSON and IZZEDIN (1918) record, as a case of great rarity, acute obstruction, necessitating laparotomy, due to a *Taenia saginata*. The absence of acute pain and the slight amount of collapse, associated with symptoms of acute obstruction, are regarded as characteristic of obstruction due to intestinal parasites.

Cysticercus cellulosae.

A case of general infection by *Cysticercus cellulosae* was reported by ABBOTT (1921) in the *Lancet*. The patient suffered from melancholia with a history of headache, dimness of vision, transient weakness of the left side and occasional fits. There were numerous small shotty subcutaneous nodules on the arms. After death, due to tuberculosis, the heart and the whole of the convex surface of the brain were found studded with cysts. They were numerous also in the subcutaneous tissues of the thorax and abdomen, and in the peritoneum. None occurred in the lungs, liver apex or kidney. In another case, recorded by HUGHES (1921), several cutaneous cysts, varying in size from that of a pea to a cherry, were distributed along the line of cutaneous nerves and had given rise to a provisional diagnosis of multiple neurofibromata.

* For Part I, see Vol. 19, p. 361.

(8348) Wt.P.5/115 1500 2/23 Harrow G.75.

VASILIN (1921) had a case in which the cysticerci were limited exclusively to the meninges. A medullary tumour, between the seventh cervical and the second dorsal nerves was diagnosed, but none could be found at operation. Autopsy showed severe fibrous inflammation of the pia mater, the thickening causing pressure on the roots of the cervical nerves. The larger vessels contained thrombi and cysticerci, which were the direct cause of endarteritis. No adult tapeworms were found in the intestines.

Infection of the central nervous system has also been studied by WATERHOUSE (1913). Clinical histories of two cases, which are given in detail, show that the epileptiform convulsions differ from true epilepsy in the more gradual onset of the fits. Von HERRENSCHWAND (1916) records two cases of subretinal cysticercosis in soldiers, both of whom it is said also harboured *Taenia saginata*. A. PILLAT (1920) reports a subretinal case from Poland, which is said to have followed after eating raw ham. No adult tapeworm was found. De SCHWEINITZ and WIENER (1919) describe the ocular examination of a case of cysticercosis of the vitreous at which distinct peristaltic movements of the cyst were visible, and the movements of the protruded head, neck and body were often very active. Ocular cysticercosis is a very rare condition ; from 1853 to 1866 V. GRAEFE (1866) saw only 90 cases out of 80,000 patients with eye diseases.

Cysticercus bovis.

FONTAN (1919) describes an apparently genuine case of *Cysticercus bovis* from the mammary region. Attention should be called to the economic importance of a paper by RANSOM (1914) on the destruction of vitality of *Cysticercus bovis* in beef. After six days' exposure to a temperature ranging from 11° to 15° F., the cysts in a heavily infected carcase gave no evidence of life, either by microscopical examination or by feeding experiments, whereas the cysticerci were all active after eight days in a portion kept unfrozen as a control. As 21 days in " coolers " is necessary to attain the same result, meat with slight infestation can be handled more rapidly by exposure to lower temperatures.

Coenurus.

The polycephalous tapeworm cysts, classed under the term *Coenurus*, which occur in the sheep, rabbit and gerbillus, are larval stages of Taenia species which, as adults, inhabit the dog. Twice only have coenuri been found in man. In 1913 BRUMPT described and figured a human infection of the brain with *Coenurus cerebralis*, and in 1919 TURNER and LEIPER recorded the presence of *Coenurus glomeratus* of the gerbille in a subcutaneous tumour excised from the intercostal muscle of a native of Northern Nigeria.

Taenia echinococcus (Hydatid).

Of the many clinical papers on hydatid which have appeared during recent years, that by REMLINGER (1918) is the only one of special interest in tropical pathology. In Tangiers, where hydatid is common, two cases occurred in which cysts opened into the bladder, resulting in chyluria. The pathology in these cases is apparently identical with that of filarial and bilharzial infections, and of non-parasitic tumours.

Hymenolepis diminuta.

This parasite normally inhabits the small intestine of the rat, and when infection occurs in man it is chiefly during the early years. Its presence is accompanied by few or no symptoms. De MAGALHÃES (1896) and NOC (1911) have noted the occurrence of enteritis in their cases. According to GONZAGA and CARVALHO (1918) its expulsion by treatment is difficult. In 1904 RANSOM collected from the literature 12 records of infestation of man. Since then additional cases have been described by DEADERICK (1906), GALLI-VALERIO (1910), LEIPER (1913) from Grenada, W.I., HOKI (1917) from the Loochoo Islands (2 soldiers), and GEDOELST (1920) from the Belgian Congo.

JOYEUX (1916, 1919, 1920) has studied the development of this species in detail, confirming the early work of GRASSI and ROVELLI (1888–92). In Italy the normal intermediate host would appear to be *Pyralis farinalis* (wrongly called *Asopia farinalis* by GRASSI and ROVELLI) in the adipose tissue of both larva and imago, often as many as 20 cysticercoids are found. The cysts also occur in the beetles, *Akis spinosa* and *Scaurus striatus*, and in the earwig, *Anisolabis annulipes*, common in Catania, Florence, Rome and Como. JOYEUX (1916) showed experimentally that *Tenebrio molitor* could be readily infected in the adult but not in the larval stage. The larvae only were susceptible in *Ceratophyllus fasciatus*, *Xenopsylla cheopis*, *Pulex irritans* and *Ctenocephalus canis*. Rats were readily infested when fed with infected specimens of these insects. Later, JOYEUX (1920) added to this list *Geotrupes sylvaticus*, which, however, he does not regard as a frequent intermediary. It is readily infected experimentally, but is not commonly available for the rat. He also infected *Ceratophyllus fasciatus* from Paris, Algiers and Salonica with equal ease, likewise *Xenopsylla cheopis*, *Leptosylla musculi*, *Pulex irritans*, *Ctenocephalus canis*, but failed to find actual infections in the fleas (*C. fasciatus*, *X. cheopis*, *L. musculi*) found on rats in Salonica, although larvae have been previously noted by NICOLL and MINCHIN (1910) (1911) in *C. fasciatus* in England, and JOHNSTON (1913) in Australia. The feeding of rats and mice with the eggs of *H. diminuta* failed to produce infection.

Hymenolepis nana.

The morphology and life-history of this species present characters of an unusual nature. Many have held that the adult worm in man is identical with *H. murina* in the rat. According to GRASSI, the life-cycle can complete itself in the intestinal mucosa of the rat, while NICOLL and MINCHIN (1911) and JOHNSTON (1913) claim to have obtained cysticercoids of this species in fleas. JOYEUX (1920) has reviewed the whole question in detail. His conclusion is that there is a slight but real difference between *H. nana* and *H. murina* (now named *H. fraterna*, Stiles, 1906), based on the suckers and the hooks, but these cannot be applied with success to the diagnosis of individual specimens. His attempts to infect larvae of fleas were entirely negative, and he suggests that the larvae found by NICOLL, MINCHIN and JOHNSTON are those of *Hymenolepis microstoma* of the rat. He confirms the main points of GRASSI and ROVELLI's work on direct infection of the definitive host. The cysticercoid is completely developed in the intestinal villi of the rat 100 hours after infection with the eggs from a rat. The worms attain sexual maturity in 14–20 days. He agrees with GRASSI and ROVELLI that direct infection is the *only* method of transmission.

JOYEUX (1920) relates a series of 22 experiments on rats with material from three human cases of *H. nana* infection from West Africa, Algiers

and Belgium respectively. In every case the animals were uninfected with the human material, but were afterwards successfully infected with eggs of the rat (*H. fraterna*) cestodes. SCHNELL (1918) failed to obtain experimental infection in mice with human material. SAEKI (1920) swallowed over 1,000 eggs of *H. nana* at a time without result, but succeeded in infecting a girl four years old. The geographical distributions of *H. nana* (of man) and *H. fraterna* (of the rat) are not identical. JOYEUX (1920) points out that *H. nana* has only been recorded five times in man in France, while of the rats of Paris 20·79 per cent. are infested. *H. fraterna* is found without difficulty wherever it is looked for, all over the world. *H. nana* is limited to warm countries, frequent in the regions bordering the Mediterranean, in Asia, Africa, and seemingly in Oceania.

Incidence.—HASEGAWA and YAMANOUCHI (1918) found five cases among 7,094 hospital patients in Tokio. In one case 4,078 tapeworms were present. MAPLESTONE (1920) states that WAITE found 51 cases among 14,577 persons in North Queensland. STEWART (1916) recorded eight cases out of 320 sepoys in the Indian garrison at Hong Kong. In Brazil, CARINI and MASTRANGIOLI (1912) have seen eleven cases since 1908. BETTENCOURT (1916) gives *H. nana* as the commonest tapeworm in Portugal; 33 out of 503 children were found infected when examined for the parasite.

Dipylidium caninum.

BLANCHARD, LEROUX and LABBÉ (1914) find that 76 authentic cases in man have been reported from various parts of Europe, United States, Venezuela and South Africa. Further cases have been recorded since by (*a*) VINCENZO (1914), in a child four years old, from Offida (Ascoli), in Italy; (*b*) MENDOZA-GUAZON (1916), in a child eight months old, in the Philippines; (*c*) ANCONA (1916), in a girl, aged five, in Italy. LEIPER (1921) exhibited at the Royal Society of Medicine a specimen obtained by Captain Norman HALL from an old woman in German East Africa.

JOYEUX (1920), repeating early work on transmission, finds that the adult fleas cannot take up the eggs. These are eaten by the larvae at an early age, but the development from the hexacanth embryo, which lies in the adipose tissue muscles of the flea, is delayed until the imago is reached, when development then proceeds to the infective stage.

Davainea madagascariensis.

In 1916 BLANCHARD extended his previous notes on the morphology of *D. madagascariensis* by describing more fully the head, which bears about 110 hooks arranged on at least five concentric rows in the suckers. AKASHI (1916) described as a new species *Davainea formosana*, a strange tapeworm found in a child in Formosa. The strobila measures 43 cm. in length; the globular head has unarmed suckers and the hemispherical rostellum bears two rows of numerous rose-thorn hooks. The egg-masses are often irregular, sometimes polygonal in shape, and the eggs measure 0·046 mm. But these differences do not appear to justify the creation of a new species.

Bertiella satyri.

This parasite, hitherto known only from the orang-outang of Borneo, has been identified by BLANCHARD (1913) in several fragments of tapeworm obtained from the stools of a girl, aged eight, living at

Port Louis, in Mauritius. It was claimed that the discovery of *B. satyri* in areas so widely separated as Mauritius and Borneo was no more remarkable than that of *Davainea madagascariensis* in Comoro, Mauritius, Siam and British Guiana ; but in the latter case the only known host is man, and the case in British Guiana occurred in indentured Indian labour.

Dibothriocephalus latus.

In 1916 SINGER estimated that only 30 cases of Bothriocephalus infection had been recorded in the United States of America, and that one only of these was American born. As NICKERSEN had frequently found the larvae of *B. latus* in fish caught in the great lakes, it seemed probable that its occurrence had been overlooked. In 1919 RILEY cited two cases, both children, who had acquired the infection in Minnesota, where they had spent the whole of their lives. In the same State, NICKERSEN (1920) recorded four endemic cases, and gave the opinion that this tapeworm is as common as the other tapeworms of man in this region. O'FARRELL (1918) described a case from near the River Shannon, in the County of Leitrim, Ireland, and refers to a previous unrecorded case. G. RAILLIET (1913) removed a specimen from a woman who had always lived in the environs of Paris.

The morphology of the parasite is already well known, but MAGATH (1919) has made a valuable study of the eggs, from which he concludes that these vary so greatly in size that this character is of no great value for identification, but that the egg-shell possesses, however, a distinctive morphology. LEON (1916) described, under the name *Bothriocephalus taenioides*, a worm from Roumania, which at first sight resembled a portion of a Taenia, but which on further examination seemed to be a misshapen *B. latus*. In 1920 he recorded a second case ; the portion of worm found presented the same characteristics. The author contrasts his specimen with *D. parvus*, Stephens, 1908. We are of opinion that neither of these species is valid, but both represent young or abnormally extended specimens of *D. latus*.

CHOLODKOVSKY (1916) names a single specimen *D. minor* n. sp. The uterus is said to have an irregular sac-like outline, not the characteristic rosette of *D. latus*.

The most important experimental work upon cestode development during the past 10 years is undoubtedly that of ROSEN and JANICKI on Dibothriocephalus. JANICKI (1917) shows that the embryos hatch from the eggs in from 13 days to 5 weeks at summer temperature, and that young trout and pike, perch and turbot were not infected when exposed to actively swimming onchospheres. From these negative results JANICKI concluded that an undiscovered host acted as the first intermediary and that the fish were only the second intermediate hosts. ROSEN (1917), acting in conjunction with JANICKI's researches, attempted without success to infect experimentally Gammarids, Chironomus, Corethra, Oligochaets, *Cyclops orthonoides*, *C. macrurus*, *C. vernalis*, *C. leuckarti*, *C. viridis*. Later, ROSEN (1917–18) succeeded in infecting *Cyclops strenuus* and *Diaptomus gracilis*. After two or three weeks the larva appeared to have attained its full development within its first intermediary and measured 0·5 mm. Young trout became infected after feeding upon the experimentally infected crustacea. With Dibothriocephalus eggs from the faeces of a dog GALLI-VALERIO (1919) successfully infected *Cyclops strenuus*, thus confirming ROSEN's observations.

Sparganum mansoni.

According to YOSHIDA (1917), 55 cases of *Sparganum mansoni* occur in medical literature. The majority of these were reported from Japan. To these MATSUHARA (1916) adds a further case under the name *Taenia lingula.* MOORE (1914) described a specimen measuring 21·5 cm. accidentally removed from cancerous masses in the breast of a native of Texas, the first recorded from the New World. To the two cases previously recorded from Australia, CLELAND (1918) added a third, withdrawn from a small inflammatory swelling on the leg of a patient living at Sydney. CASAUX (1914) observed ocular sparganosis in the vicinity of the Tonkin delta, and described eight cases which had come under his personal observation. The infection manifested itself by pain, redness and lachrymation of the eye, associated with extreme ptosis of the upper lid, which was swollen and oedematous. The parasite was enclosed in fibrous nodules in the eyelid. Notes of three additional cases of ocular infection were published by GAIDE and RONGIER (1915). These cases came under their notice at the Central Hospital at Hanoi, the capital of Annam, where a further case was reported by MOTAIS (1920), who states that similar worms occur in pigs in Annam. Several attempts have been made to link the Sparganum with Dibothriocephalus, for morphologically *Sparganum mansoni* resembles an overgrown Plerocercoid. YAMATA (1916) found a strap-shaped worm in the abdominal cavity of a woman and introduced this into the stomach of a small dog. Thirteen days later eggs were found in the dog's faeces. After two months the dog was killed and a large Bothriocephalus was found. YOSHIDA (1917) found 36 specimens of Sparganum in the body-cavity and body-wall of an emaciated cat and fed these to two young cats. Five days later, however, no worms could be found in the gut of the cats. Later, a specimen of *Sparganum mansoni,* which was obtained from a human patient, was fed to a laboratory dog 27 days old. Two months later a Dibothriocephalus 2·5 metres long was recovered. The eggs of this tapeworm differed markedly from those of *D. latus.*

OKUMURA (1919) has found larval cestodes in monkeys, cats, pigs, rats, domesticated fowls, ducks, snakes and frogs in Japan. The dog is infected with a Dibothriocephalus apparently identical with that reared experimentally in dogs by YAMATA (1916) and YOSHIDA (1917) from human Sparganum material. From the ova he succeeded in infecting *Cyclops leuckarti,* which, according to ROSEN and GALLI-VALERIO, is resistant to infection with *D. latus.* In the snake, *Elaphis climacophorus,* and in the frogs of Japan a Plerocercoid occurs which closely resembles human Sparganum. By feeding these to a dog the author obtained adult Dibothriocephalus which gave rise to eggs identical with those obtained by feeding dogs with the human Sparganum. Moreover, when mice and frogs were experimentally fed upon infected cyclops the Procercoids having pierced the gut were able to live in the body-cavity.

Sparganum prolifer Ijima 1905.

A second and third case of *S. prolifer* have been found in Japan by YOSHIDA (1914), and KODAMA (1917) described the histological changes in what would appear to be another case. STILES (1908) has described a further specimen which had been removed from under the skin of a fisherman in Florida (U.S.A.) by Dr. GATES.

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* References are to summaries in the *Tropical Diseases Bulletin* unless otherwise stated. Dates in parentheses refer to year of publication of original papers.

KALA AZAR.

INDIAN MEDICAL GAZETTE. 1922. June. Vol. 57. No. 6. pp. 221–224.
The Problems of Kala-Azar.

This leading article on the problems of kala azar covers much the same ground as the review which follows. One or two points seem worthy of note. A protest is made against the treatment of diseases which are suspected as being possibly kala azar without the discovery of the parasite. The writer says :—" It is distressing to reflect on the thousands of cases which are to-day submitted to the long and tedious antimony treatment necessary to cure, without the diagnosis having been proved." The present position of the treatment of the disease by intravenous injections of tartar emetic cannot be regarded as satisfactory. It is exceedingly difficult to get patients to submit to the long course, while the view that the administration of a total of 200 cc. of 1 per cent. solution of tartar emetic will bring about a cure is found to be erroneous. There are cases which resist this quantity of the drug, and it appears that certain strains of *Leishmania donovani* are more resistant than others. The discovery of some antimony compound suitable for intramuscular use is urgently needed.

The investigations connected with the bed bug are reviewed and it is asked if the present position with regard to investigation of kala azar in India is satisfactory. Independent investigators are attacking the problem in various areas but the time has come for co-operation, and the approach of the subject with a clean slate, unoccupied by preconceived ideas and conceptions, offers a better chance of solution of the problem of kala azar, which remains to-day the most outstanding one in tropical medicine.

C. M. Wenyon.

MACKIE (F. P.). **The Problem of Kala-Azar.**—*Indian Med. Gaz.* 1922. Sept. Vol. 57. No. 9. pp. 326–331. With 1 plate.

In this interesting summary of facts which have a bearing on the problem of the possible mode of spread of kala azar, the writer considers the subject with an open mind. The more he sees of the disease the more chary does he become of excluding a diagnosis of kala azar on clinical grounds alone. The final diagnosis must be made by the discovery of the parasite by examination of the peripheral blood and spleen puncture fluid in smears or by the culture method. The newly introduced formol-gel test promises to be of great assistance, but at present its limitations and errors are not known.

The escape of leishmania from the body for infection of another host may conceivably take place from the skin or intestine, as the parasites occur in lesions in both these situations, but their presence in the blood is strongly suggestive of the possibility of their being taken up by some insect. The discovery of small bodies in the salivary glands of bugs by Mrs. ADIE and the author's confirmation of this, inclines him to the belief that a hitherto unknown stage of the leishmania has been discovered. [This statement was evidently made before it was known that these particular bodies were probably microsporidia, as CHRISTOPHERS has pointed out.] The discovery of the " thick-tailed " form of leishmania in the bed bug by CORNWALL and the intracellular development in the same host as elucidated by

Mrs. ADIE and PATTON, appear to be in favour of the bug transmission hypothesis, but it is emphasized that the supreme test of feeding large numbers of heavily infected bugs on a human being which PATTON and his assistant say they have done on themselves, has never led to infection of either of these intrepid investigators. The sand-fly, which is the probable vector of oriental sore, deserves more attention from the point of view of kala azar. The fly is known to occur in Assam and has been taken in kala azar houses. A fly from such a house was found to be infected with flagellates [but the reviewer saw films of this flagellate, which is a crithidia and not a leptomonas]. The sand-fly, however, is known to harbour a leptomonas. The bug *Conorrhinus rubrofasciatus*, first suggested as a possible agent by DONOVAN, is mentioned. The flagellates in these bugs are crithidia and not leptomonas. A laboratory-bred nymph was found infected with this flagellate 17 days after feeding on a kala azar case. It is hardly possible that the crithidia were developed from the leishmania, and it is suggested that the bug may have acquired its infection hereditarily, but the author does not state whether the nymph had an opportunity of feeding on the faeces of the adult, a habit which BRUMPT has shown Reduviid bugs to possess.

The susceptibility of laboratory animals to *Leishmania donovani* in India is considered. It has been found that a transient infection is more common than has been suspected. Thus, by adopting the culture test for infection it has been shown that the guinea pig, rabbit and monkey may be infected. Two guinea-pigs gave a positive culture on the eleventh day, the monkey on the thirty-sixth day, and the rabbit (anterior chamber of the eye) on the fourth and nineteenth day. A mouse which had been injected with the alimentary contents of five bugs fed seventeen days before on a case of kala azar was found after death to contain leishmania.

Under the heading of treatment the dangers of incomplete cure are emphasized. The patient, much improved in health though still harbouring leishmania, may be received back by his friends while he is acting as a carrier of the disease.

C. M. W.

NAPIER (L. E.). **Annual Report of the Work of the Kala Azar Research Laboratory during 1921.** *Ann. Report of Work done in the Calcutta School of Trop. Med. and Hyg. under the Endowment of the Indian Tea, Jute and Mining Association.* pp. 1–36. With 1 chart.

This report, if it serves no other purposes, emphasizes the great difficulties which attend kala azar investigations in India. Attempts to secure easily-handled strains of *Leishmania donovani* in experimental animals have, as is the experience of many other workers, been attended with disappointing results. Two *Macacus rhesus* were infected, but these animals were apparently unaffected by the presence of the parasite and appeared to recover. One puppy became infected and died presumably of the disease. Keeping vermin-free monkeys together in a cage, one being infected and the other not, keeping monkeys under similar conditions though not freed from lice, and the feeding of batches of bugs on an infected monkey and then on an uninfected one, gave only negative results. An experiment in which bugs were fed on infected spleen juice and then on a monkey likewise produced no infection.

An attempt was made to infect bugs by injecting spleen pulp per rectum. In some cases unchanged leishmania were found in the rectum within three days of the injection, but no developmental forms were observed.

The globulin precipitation test for kala azar suggested by BRAHMACHARI and the haemolytic test of RAY were investigated, but it was found that neither was specific for kala azar. The aldehyde test, details of which have been noted in another paper [see this *Bulletin*, Vol. 19, p. 546] gave better results and the statement is made that there is every reason to believe that a definitely positive aldehyde reaction is absolutely diagnostic of kala azar.

A number of pharmacological experiments were undertaken with the object of discovering a "scale" preparation of antimony tartrate which would produce the minimum reaction when given either intravenously or intramuscularly. A notice of these has already appeared in another paper (this *Bulletin*, Vol. 19, p. 550). As regards the cases actually treated, of 19 cases who were given intravenous potassium antimonyl tartrate 13 were discharged cured, 2 died under treatment, and 4 had an uncompleted course. With intravenous sodium antimonyl tartrate 1 was cured, while with intramuscular "scale" sodium antimonyl tartrate, of 10 cases treated 7 were cured, 2 had an incomplete course and 1 died. Treatment by intravenous stibenyl is mentioned, but another paper reviewed in this number gives more details of the cases.

In the concluding remarks it is pointed out that kala azar is essentially a disease of small rural communities and not of towns, and though the bug as agent of transmission carries the heaviest weight of suspicion the case against it has not been proved. It exists in greater millions in towns than in rural districts. The one evident factor which is present in towns and absent amongst rural communities is sanitation.

C. M. W.

ASSAM. **Annual Public Health Report of the Province of Assam for the Year 1921.** [YOUNG (T. C. McCombie), Director of Public Health.]—pp. ii + 34 + 3. 1922. Shillong: Assam Secretariat Press. [Price 12 annas=1*s*. 6*d*.]

The recorded mortality from kala azar in Assam for the year 1921 is slightly higher than in the previous year. This is to be accounted for by the rise in the number of deaths in Nowgong and the increased efforts which have been put forth in Sylhet, which have resulted in more accurate diagnosis of the cases of fever. The numerous hospitals and dispensaries which have been set up to cope with the disease have treated during the year 15,880 cases, some of which, it is admitted, may have been cases of chronic malaria. Absolute diagnosis has not been possible in all cases, but it is hoped that the new formol-gel test for kala azar will do much to eliminate this error. Recurrence of infection occurred in a small number of fully treated cases, but this is not surprising, as in the plains the patient returns to his already infected home, the plains man finding it much more difficult to abandon his old home for a new one than the dweller in the hills. The hill man himself usually turns a kala azar patient out of the village and burns his house, with the result that he seeks admission to hospital. In the plains this custom does not obtain. The effect in the North Cachar Hills is that the outbreak appears to be extinguished. The outlook

is a very hopeful one and the writer speaks with satisfaction of the stimulating sight of troops of patients, mostly children, who attend the clinics for a treatment in which the chances of recovery are equal to what were formerly the probabilities of death.

C. M. W.

Awati (P. R.). **Survey of Biting Insects of Assam with Reference to Kala-Azar for the Whole Year from November 1921 to October 1922.**—*Indian Jl. Med. Res.* 1922. Oct. Vol. 10. No. 2. pp. 579–591. With 4 figs.

With the object of obtaining some light on the etiology of kala azar, an investigation of the biting insects associated with human beings and their habitations in Assam was undertaken. Two areas were studied, one in which kala azar was endemic and the other which was free from the disease.

The climate of Assam shows a dry season corresponding with the winter and spring in England and a wet season during the remainder of the year. Throughout the year in the areas investigated the humidity was high. All villages, especially those in the kala azar area, are near to water, and almost every village in the infected area is surrounded by dense groves of bamboos. The drinking water is usually dirty and it is not generally stored in the house for more than 24 hours. It results that mosquitoes do not breed in the storage vessels. Bed-bugs appear to be equally distributed in both the infected and the uninfected areas, but there is a great difference between the wet and dry seasons. The high continued temperature, combined with the humidity, may account for the decrease in their number during the wet season. Pediculi are less in the infected area than in the uninfected area, and there was no seasonal variation in their incidence. The Reduviid bug, *Conorhinus rubrofasciatus*, is found in the infected area throughout the year, but it has not yet been found in the uninfected area. Sand-flies (*Phlebotomus*), ticks, mites (*Trombidium*), fleas and certain Reduviid larvae covered with mud, which do not appear to be those of Conorhinus, occurred in both areas.

C. M. W.

Perry (H. Marrian). **Some Observations on the Occurrence of *Leishmania* in the Intestinal Tissues in Indian Kala-Azar, on the Pathological Changes occasioned by their Presence, and on their Possible Significance in this Situation.**—*Jl. Roy. Army Med. Corps.* 1922. Nov. Vol. 39. No. 5. pp. 323–329. With 3 figs.

The examination of sections of the small intestine of two cases of kala azar revealed the fact that in both a remarkable change had taken place in the villi. These structures had become swollen peripherally and appeared as polypi connected with the submucosa by narrow peduncles of little more than fibrous tissue. The columnar epithelium and basement membrane were usually intact, though in some cases they were not so, but the most striking change was that the villi were filled by enormous numbers of endothelial cells which, especially towards the centre, were packed with leishmania. In some cases the cells had broken down and the parasites were distributed amongst the cellular debris. Parasites were present in endothelial cells in the submucosa in smaller numbers, but this layer of the intestinal wall was otherwise normal in appearance. Though other observers have

noted the presence of leishmania in the intestinal wall, nothing comparable with the changes and intense infection here described has been recorded.

The presence of such a condition naturally raises some interesting questions, which are discussed. One of the striking features of kala azar is the extreme emaciation of the patients, and it is suggested that the profound alteration of the intestine, which interferes with absorption, may account for this. The presence of such large numbers of parasites in the villi—some of which are breaking down, so that the infected cells are liberated into the lumen of the intestine—shows that parasites may escape from the body in this way in considerable numbers. The possibility of some resistant forms being found in the faeces and leading to the spread of infection owing to absence of all conservancy methods, as in Assam, or through some faecal feeding insect, has to be considered.

C. M. W.

Nicolle (Charles) ; Calamida (F.) ; Macotta ; Villaṅ (Georges) ; Spezzafumo (U.). **Chronique du Kala-Azar en Tunisie : LX^e & LXI^e. Observations tunisiennes de Kala-Azar (Résumée) : LXII^e Observation tunisienne de Kala-Azar (Cas observé à Degache, sud tunisien, et traité par le trépol) : Observation d'un cas de Kala-Azar contracté en Sicile et reconnu en Tunisie.**—*Arch. Insts. Pasteur de l'Afrique du Nord.* 1922. June. Vol. 2. No. 2. pp. 230–239. With 2 charts in text.

The history of kala azar in Tunis is continued in this report [see this *Bulletin*, Vol. 18, p. 238]. Three new cases of infantile kala azar are recorded, one which originated in Southern Tunisia, at Degasche, being the first from a district so far south. The total number of cases observed in this endemic area since 1906 is 62.

Canine kala azar still occupies attention. Of 170 dogs examined between January 11 and March 14 one was found infected, thus giving a total of 75 cases of the canine disease met with in Tunis since November 8, 1920.

It was previously announced that spleen puncture had been performed in 113 cases of splenic anaemia without any causative organism being found. A further 12 cases have been thus examined without any light being thrown on the cause of the disease. One of the kala azar cases was treated with intramuscular injections of 1 cc. of trepol given at four or five days' intervals. During the month of treatment the child improved considerably, the temperature becoming normal. The child died, however, of an acute diarrhoea. Leishmania had been found in spleen puncture made five days before death. The authors consider that the drug had a real therapeutic effect, which was evident in spite of the fact that the case was an unfavourable one for treatment in that the disease had already run a course of 13 months.

Both the other cases died, as did also a fourth case in which the disease had been contracted in the province of Palermo.

C. M. W.

Vaglio (R.). **Trasmissione della Leishmaniosi interna.**—*Pediatria.* 1922. Aug. 1. Vol. 30. No. 15. pp. 728–734.

This paper contains a summary of the observations made by various observers regarding the vexed question of the mode of transmission of kala azar. It contains nothing new, but the records, which are briefly stated, are intended to assist those who wish to follow up the investigation.

C. M. W.

CARONIA (J.). **De la ponction de la rate et de la moelle osseuse.**—*Bull. Soc. Path. Exot.* 1922. Oct. 11. Vol. 15. No. 8. pp. 722–729. With 5 text figs.

The author from a large experience of the operation of spleen puncture for the diagnosis of infantile kala azar in Italy has elaborated what he regards as the least dangerous and the most simple technique. To reduce to a minimum the dangers of laceration of the spleen it is necessary to avoid hindering the movements of the needle which are caused by the respirations of the patient. The use of a needle fixed to a syringe forms an immobile system which is liable to cause a tear in the spleen. Accordingly the author advises the use of a fine, long needle alone, with no syringe attached. A No. 12 needle, 7 to 9 cm. in length, is suitable for the purpose. The patient lies on the bed on his back, or, in the case of small children, in the arms of a nurse. With the left hand the spleen is pressed upwards to render it immobile and the needle is introduced only through the skin perpendicular to the surface. An interval is allowed to elapse to enable the patient to become composed after the shock caused by the puncture of the skin. The needle is then pushed forwards into the spleen and allowed to move naturally with the respirations. No syringe is attached and no aspiration is necessary. It is then withdrawn and it will be found that sufficient material adheres to the point to make the necessary films. Material in the needle may be driven out with the stylet. By this technique it is claimed that blood is not sucked into the needle and that the material obtained consists of spleen pulp alone, so that more rapid and accurate diagnosis is made.

The author then goes on to describe an operation for puncture of the bone for obtaining marrow, an operation which is of value especially in case of haemophilia, where spleen puncture is contra-indicated. There is no danger attaching to the operation, which is a very simple one in the case of children. The one disadvantage is that there is a greater tendency to the extraction of blood with the marrow, so that the discovery of the parasites in the films may not be so easy as after spleen puncture. The site selected is the upper epiphysis of the tibia between its external and anterior surfaces. A stout needle or small trochar is employed, and this, with the stylet in position, is introduced obliquely from above downwards through the skin and forced through the surface of the bone. Entry into the cavity is easily felt by the sudden loss of resistance. The mouth of the needle is probably blocked with particles of bone and these are dislodged by withdrawing the needle very slightly and clearing the débris away by use of the stylet. When this has been done the needle is quickly withdrawn and sufficient marrow will be found adherent to it to enable films to be made.

C. M. W.

BANERJI (Dhirendra Nath). **An Announcement. A Preliminary Note on the Diagnosis of Kala-Azar by Examination of Bone-Marrow.**—Reprinted from *Calcutta Med. Jl.* 1922. Apr. Vol. 16. No. 10. 1 p.

The author announces what he regards as a simple and safe method of examining for leishmania in cases of suspected kala azar by obtaining marrow from the sternum. The anterior plate of the gladiolar portion of the sternum is opened by means of a Southey's trochar and material

obtained from within the bone by means of a hypodermic syringe. He has obtained parasites from all the cases of kala azar he has examined. A full report of the results of his investigations will be published later.

C. M. W.

Ayyar (T. Seethapathy) & Krishnan (K. V.). **The Value of Culture of the Peripheral Blood in Kala-Azar as a Diagnostic Procedure.**—*Indian Med. Gaz.* 1922. July. Vol. 57. No. 7. pp. 255–256.

This paper gives the results of the examination by the culture method on N.N.N. medium of 49 samples of blood taken from the veins of cases of suspected kala azar. Of the 49 cases 9 were eventually found to be some other disease while the diagnosis of kala azar was regarded as correct in the other 40, of which 5 were proved cases in which puncture of the spleen had been performed. From the 40 samples of blood, cultures on N.N.N. medium were obtained in 25 per cent. The technique employed was that recommended by Cornwall. As a rule, the tube must be kept for at least 20 days before a negative result can be accepted, but in one case a tube showed flagellates on the fortieth day, though it had been previously negative.

C. M. W.

Milio (Giulio). **Su una siero-reazione precipitante nella diagnosi di Leishmaniosi.**—*Pediatria.* 1922. Oct. 15. Vol. 30. No. 20. pp. 957–959.

The publication by Brahmachari of an account of a new test for kala azar which was described in 1917 (this *Bulletin*, Vol. 11, p. 152) and more fully in his book "Kala-Azar and its Treatment," led the author of the paper under review to investigate the reaction in cases of kala azar in Italy. In a Wassermann tube was placed 1 cc. of serum and above the serum 2 cc. of distilled water. The reaction was positive when a ring of turbidity formed at the line of contact of the two fluids. A positive result was obtained in 14 consecutive cases of kala azar, while in 14 controls, including a case of splenic anaemia, it was entirely negative.

C. M. W.

i. Bessemans (A.). **Influence de la concentration des sérums sur leur formolgélification et sur leur pouvoir formolgélifiant. Influence de la température sur leur formolgélification.**—*C. R. Soc. Biol.* 1922. July 1. Vol. 87. No. 24. pp. 398–401.

ii. Bessemans (A.). **Influence de la dilution sur le pouvoir formolgélifiant des sérums.**—*Ibid.* pp. 401–404.

These papers describe changes undergone by the various sera after concentration by evaporation and the addition of salts which modify the property they possess of jellying after the addition of formol. The power of jellying of a serum is increased by evaporation of the serum in the cold before the addition of formol. Certain sera which do not jelly in their natural condition acquire this property when concentrated. Similarly the power of jellying is increased by the addition of salts such as $(NH_4)_2\ SO_4$, Na Cl and $MgSO_4$. As regards temperature it was found that no relation existed between the minimum temperature at which any particular serum would solidify and its jellying on the addition of formol.

C. M. W.

Combiesco (D.). **Recherches sur la gélification du sérum par l'aldéhyde formique chez des animaux en état d'anaphylaxie.**—*C. R. Soc. Biol.* 1922. July 8. Vol. 87. No. 25. pp. 416–417.

The interest aroused by the proposed formol-gel test for kala azar warrants a notice of the above paper. The author has shown that formol will jelly the serum of cases of scarlatina and erysipelas. The reaction depends upon the unstable condition of equilibrium of the colloidal substances in the serum. The serum of a normal guinea pig does not give the reaction, whereas the serum of guinea pigs rendered unstable by the production of a condition of anaphylaxis does so. The reaction is most marked during the actual anaphylaxis shock.

C. M. W.

Gaté (J.) & Papacostas (G.). **La formol-gélification des sérums dans diverses maladies.**—*C. R. Soc. Biol.* 1922. July 15. Vol. 87. No. 26. pp. 543–544.

The authors have tested the formol-gel reaction of the sera from a large number of diseases. Each serum was put up with 2, 3, 4 and 5 drops of formol per cc. of serum and the readings were made at the end of three days. It may be noted that a positive result was obtained in syphilis in 50 per cent. of the cases, and in nearly all cases of erysipelas. In typhoid fever and pneumonia it was usually negative.

C. M. W.

de Buen (Sadi). **Un caso de Kala-Azar en la provincia de Cáceres.**—*Arch. de Cardiología y Hematología.* Madrid. 1922. June. Vol. 3. No. 6. pp. 205–208. With 2 charts and 3 figs.

Luengo (Pablo), de Buen (Sadi) & Luengo (Emilio). **Siete casos de Kala-Azar infantil. (Provincias de Cáceres y Toledo).**—*Ibid.* Oct. No. 10. pp. 369–383. With 14 text figs.

During the antimalaria campaign which was commenced in the Province of Cáceres in Spain, in 1920, cases of splenomegaly were encountered which did not respond to quinine treatment.

The first paper describes one such case which was finally diagnosed by spleen puncture as infantile kala azar.

The second paper redescribes this first case and in addition six others. The disease appears to be typical of the infantile form of kala azar of the Mediterranean basin.

C. M. W.

Campana y Cassi (T.). **Le kala-azar infantile dans la province de Tarragone.**—*Rev. Méd. et Hyg. Trop.* 1922. May–June. Vol. 14. No. 3. pp. 71–72.

This paper records two cases diagnosed as kala azar in children in the Province of Tarragona, in Spain. No mention is made of the discovery of leishmania. One of the cases died, while the other is said to have recovered rapidly after treatment with "914."

C. M. W.

Franco (Enrico Emilio). **Le alterazioni spleniche nella Leishmaniosi infantile.**—Reprinted from *Jl. de Sci. Mat. Fisicas e Naturais.* 1922. 3rd Ser. No. 11. 40 pp. With 9 figs.

The author has conducted a minute investigation of the changes undergone by the spleen in ten cases of infantile kala azar. As in his previous papers on the histo-pathology of kala azar noted in this

Bulletin, he discusses in detail the various types of cell which he has encountered and in so doing he employs names which convey no meaning to the reviewer who, however, cannot claim any knowledge of the intricate subject of applied haematology. The function of these cells is discussed, while the possible rôle they fulfil in the pathology of the disease has afforded him a field for speculations which may be of interest to those with a knowledge of the subject, but hardly so to the medical man whose duty it is to handle kala azar in a practical manner. Anyone interested in the subject must obtain the original article.

C. M. W.

Castorina (Giuseppe). **Sul contenuto in colesterina del siero di sangue nella leishmaniosi infantile.**—*Pediatria.* 1922. Nov. 15. Vol. 30. No. 22. pp. 1076–1080.

In five normal children it was found that the cholesterin constituent of the blood varied from 1 to 1·68 parts per thousand, which agrees with the generally accepted figures. In eighteen cases of infantile kala azar there is considerably less, the quantity varying from 0·5 to 1·4 parts per thousand. A similar diminution is noted in other diseases associated with profound anaemia. In treated cases of kala azar the quantity of cholesterin increases as recovery takes place.

C. M. W.

Mallardi (Mario). **Contributo statistico-clinico alla terapia specifica della Leishmaniosi interna.**—*Pediatria.* 1922. Oct. 1. Vol. 30. No. 19. pp. 889–897.

In this *Bulletin* (Vol. 17, p. 358) a paper by Foti and Javarone was reviewed containing an account of 75 cases of kala azar treated in Professor Jemma's clinic in Naples, from 1914 to 1920. The present paper records the results of the treatment of a further 77 cases, 72 of which were treated with tartar emetic and 5 with stibiacetin. Comparing this series of cases with the former described by Foti and Javarone, it is noted that there is a distinct inprovement in the results obtained. In place of a mortality rate of 23 per cent. there is one of 14·3.

The maximum dose of drug for a child under 3 years of age is 3–4 cgm., for a child over 3 years of age 4–5 cgm. The course of injections extends over three months.

From the tables which accompany the paper it is seen that, though the five cases treated with stibiacetin are all recorded as having recovered, the last case in which this drug was used was the twelfth in the series, all subsequent cases being treated with tartar emetic. It would seem that for some reason not explained in the paper, tartar emetic was preferable.

C. M. W.

Napier (L. E.). **A Report on the Treatment of Ten Cases of Kala-Azar by Sodium Acetyl-para-aminophenyl-stibiate ("Stibenyl").**—*Proc. Roy. Soc. Med.* (Sect. of Trop. Dis. & Parasit.). 1922. Aug. Vol. 15. No. 10. pp. 44–45.

The use of stibenyl in the treatment of kala azar in India has not been followed by good results (see this *Bulletin*, Vol. 18, p. 240). The author of the paper under review gave the drug another trial. Two sets of Allen and Hanbury's ampoules were used. Six cases were

treated with the first batch. Diarrhoea, vomiting and abdominal pain were marked features which supervened, while two of the cases died with collapse within one or two days of the third dose. Four cases were treated with the second batch of ampoules. The drug from these proved less toxic but was ineffective against the disease as in two of the cases, after a full course, parasites were still obtained by spleen puncture, as also in one of the cases which died with high fever and collapse after the ninth dose. In the fourth case the treatment had to be abandoned on account of toxic symptoms, but a cure resulted after a course of intravenous sodium antimonyl tartrate.

C. M. W.

MADRAS. **Annual Report and Statistics of the Government General Hospital, Madras, for the year 1921.** [SYMONS (T. H.), Lieut.-Col., I.M.S., Supt.].—80 pp. 1922. Madras: Printed by the Superintendent, Government Press.

Some observations of interest are taken from the Physicians' Reports. Three cases of kala azar treated with stibenyl are reported by Lt.-Col. ELWES. One died and the other two did not improve till injections of 2 per cent. solution of tartar emetic were substituted. It is concluded from these and two previous cases that stibenyl is useless in the treatment of kala azar. Two cases treated 5–6 years ago with tartar emetic were seen and were apparently free from the infection.

Dr. Guruswami MUDALIYAR avoids the precipitation which occurs on sterilizing tartar emetic solution by autoclaving the salt and water separately and dissolving in the cold. He notes the case of a medical student who was believed in February to have rheumatic fever with relapses. In July he was admitted to hospital and leishmania was grown from his peripheral blood.

A. G. B.

DUNBAR (B. H. V.). **Notes on a Case treated by Intravenous Injections of Tartar Emetic.**—*Jl. Roy. Army. Med. Corps.* 1922. Oct. Vol. 39. No. 4. pp. 298–300.

The case recorded in this paper is of interest in that it is probably one of kala azar which was contracted outside the endemic areas of the disease in India. The patient, age 29, had never been in Assam and had been stationed near Quetta since December, 1921. Before that he had been in Peshawar for three years and had also been in Delhi and Simla. He had all the symptoms of kala azar but owing to his serious condition, spleen puncture was not performed so that no absolute diagnosis was made. His treatment with tartar emetic and his recovery are described, so that there seems to be little doubt that the diagnosis was the correct one.

C. M. W.

DUTTA (A. C.). [**Treatment of Kala-Azar.**] [Correspondence.]—*Indian Med. Gaz.* 1922. July. Vol. 57. No. 7. p. 279.

The writer of this letter states that he has been using sodium antimony tartrate suspended in albolene (2 per cent. and a dose of 1 cc. to commence with) for intramuscular injection in the treatment of kala azar. The cases on which he used it had already been on courses of intravenous injections, so that he is not in a position to state what results would have been obtained if the intramuscular medication had

been employed throughout. However, as there was no recurrence of the fever he thinks he is justified in assuming that absorption of the drug had taken place. The important point is that the injections caused no irritation and no symptoms of poisoning or accumulation of the drug were noticed.

C. M. W.

Brahmachari (U. N.). **Chemotherapy of Antimonial Compounds in Kala-Azar Infection. Part I.**—*Indian Jl. Med. Res.* 1922. Oct. Vol. 10. No. 2. pp. 492–522. With 10 plates.

The writer of this long paper has continued his investigations with the object of discovering some easily administered and non-toxic compound of antimony which can safely be given in the treatment of kala azar. Much of the information is of a highly technical nature which can only be appreciated by an expert chemist. The toxicity of the various compounds which have been prepared has been tested on guinea-pigs and white rats and some of the more promising have been tried on cases of kala azar.

The first part of the paper is devoted to a consideration of the changes produced in the organs of animals which have been given lethal doses of antimony derivatives. The lesions are most marked in the lungs, kidneys, liver, pituitary body and suprarenals. They consist chiefly of haemorrhages into the substance of the organs and destruction of the cells. Of all the antimonyl tartrates, ammonium antimonyl tartrate is the least toxic and it possesses a marked therapeutic value in the treatment of kala azar. On account of its low toxicity and high antimonyl content it is the best of all the antimonyl tartrates mentioned in the paper for the treatment of the disease. Of the aromatic antimony compounds urea stibamine is the least toxic and has been found useful in the treatment of kala azar. Symptoms such as vomiting and purging are much less marked after intravenous injection of an effective dose (·25 gm.) of this drug than after the effective dose (·12 gm.) of tartar emetic or sodium antimonyl tartrate.

C. M. W.

Mollow (W.). **Ueber einen Fall von Kala-Azar, behandelt mit " 205 Bayer."** [Case of Kala azar treated with " Bayer 205."]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1922. Vol. 26. No. 9. pp. 273–282. With 1 chart.

The remarkable action that Bayer 205 has in cases of African trypanosomiasis has naturally led people to wonder if it would have a similar action in other protozoal diseases. Mayer and Zeiss have shown that it is quite inefficacious in cases of Schizotrypanosome infections, as also is tartar emetic, a drug which has such a specific action in kala azar. Mollow has had an opportunity of testing the action of 205 on a case of kala azar in a man who contracted the disease apparently in Macedonia some time prior to September 1920. The disease was naturally thought to be malaria but it was found that there was no response to quinine. The patient's condition became worse, and when the diagnosis of kala azar was made in August 1921 he was in an advanced stage of the disease.

An injection of 0·2 gm. of 205 was given intravenously. This was followed 20 minutes later by a violent rigor and elevation of the temperature to 103·8° F. Two hours later the patient still had fever

and a flushed face, while he complained of severe headache. There was epistaxis and bleeding from the swollen gums, bilious vomiting and diarrhoea. The stools were at first slimy but later contained blood and mucus. Consciousness was completely retained and the attack resembled those from which he was suffering previously but was more severe in its intensity. There was some improvement in the condition at night, but violent delirium set in at midnight and the patient died at 4.30 in the morning, 16 hours after the injection.

An autopsy was not performed till the following day, over 24 hours after death. A puncture of the liver and spleen was, however, made soon after death and numerous leishmania were found in the smears. At the post-mortem the liver and spleen were found greatly enlarged, with evidence of thickened capsules and fibrinous peritonitis. The heart was dilated and the muscle showed parenchymatous degeneration. There was fluid in the pericardium. The kidneys revealed parenchymatous and fatty degeneration. Smears from the spleen, liver and bone marrow revealed leishmania only in the latter situation.

The cause of death is discussed at some length and it is pointed out that the post-mortem findings did not help to explain the sudden ending.

C. M. W.

Row (R.). **On "Reversion of the Flagellate Form of *Leishmania donovani* and *Leishmania tropica* to the Resistant Non-Flagellate Torpedo and O Body, in Culture Tubes and its Bearing on the Attempts at the Search for the Transmitter.**—*Indian Jl. Med. Res.* 1922. Oct. Vol. 10. No. 2. pp. 476–481. With 1 plate.

The author accepts it as a fact that infection of a vertebrate with leishmania will only result if resistant forms of the organism are present in the material inoculated—forms which occur in the cells in cases of natural infections. Inoculation of cultures to animals only produces infections by reason of the resistant round, oval or torpedo-shaped parasites which are present. He traces the development of these forms from the flagellates in cultures on the surface of the agar in tubes of N.N.N. medium and he argues that the natural mode of transmission will probably depend upon the same resistant forms developed in the intestine of the invertebrate or possibly in some secondary host which acquires its infection from the primary invertebrate host.

C. M. W.

Franchini (G.). **Particularités de culture de certains flagellés. De la culture des Leishmania dans le milieu de Yoshida.**—*Bull. Soc. Path. Exot.* 1922. July 12. Vol. 15. No. 7. pp. 551–555. With 2 text figs.

In old cultures of the flagellate of *Pyrrhocoris apterus* made in a blood-bouillon medium, it was found that certain aflagellate forms of the organism exhibited amoeboid movements. The same movements were seen in the forms found in a saline emulsion which was made from the completely dried deposit formed at the bottom of a tube which had evaporated about two months before. It is concluded that certain stages which appear in cultures are able to withstand complete desiccation. These amoeboid forms of the flagellates were not seen in cultures of the leptomonas of the dog flea nor in those of *Leishmania donovani*.

The medium of YOSHIDA, which is made by adding about six drops of rabbit's blood to a tube of peptone bouillon, serves for the culture of the parasites of kala azar and oriental sore, the leptomonas of the flea and of *Pyrrhocoris apterus*.

C. M. W.

LEIVA (Lamberto). **The Cultivation of *Leishmania infantum* and *Leptomonas ctenocephali* on the Triple-N Medium.**—*Philippine Jl. Sci.* 1922. Feb. Vol. 20. No. 2. pp. 179–183.

The object of the investigation described in this paper was to discover the optimum amounts of agar and rabbit's blood which should be employed in making N.N.N. medium for the culture of *Leishmania infantum* and *Leptomonas ctenocephali*. It was found that the best results were obtained with a 2 per cent. agar plus 25 per cent. blood, or a 0·5 per cent. agar plus 5 per cent. blood.

C. M. W.

ADIE (Helen A.). **A Note on Bodies observed in *Cimex rotundatus*, Linne, collected in a Kala-Azar infected Area in Assam.**—*Indian Jl. Med. Res.* 1922. July. Vol. 10. No. 1. pp. 236–238. With 1 plate.

This paper gives a description of the bodies found by the author in a bug which had been taken from the bed of a case of suspected kala azar, and prematurely announced to be possible stages of development of leishmania. The same structures have been found in three other bugs. They were met with not only in the salivary glands but also in the intestine and ovaries. The bodies are round or oval and the majority have only a single nucleus but some are stated to have both a macronucleus and a micronucleus. In some there is a clear area which may be a capsule. It was suggested by Mr. HUTCHINSON, who has had considerable experience of microsporidia, that the different staining reactions of the various forms seen may be accounted for by the maturity or otherwise of the parasite, as in the case of Pébrine. No actual measurements of the bodies are given.

C. M. W.

SEMON (H. C.) & CHRISTOPHERSON (J. B.). **Case of Leishmaniasis of the Skin.**—*Proc. Roy. Soc. Med.* (Sect. of Dermat.). 1922. Nov. Vol. 16. No. 1. pp. 8–11. With 2 text figs.

The cases described are of two nursing sisters who contracted Oriental sore on the cheek in Mesopotamia. In one case the sore had apparently healed under treatment by antimony ointment, boric ointment, and X-rays. There remained, however, a small lump, which persisted. Five months later this became larger, while other nodules to the number of 25 appeared around the site of the old sore. No leishmania were to be found in the lesions. The general appearance was that of lupus vulgaris. The second case was of the same nature, and it is concluded that the condition represents a hitherto unrecognized form of dermal leishmaniasis which resembles lupus in its clinical appearance. In the discussion which followed the reading of the paper various opinions were expressed. It was thought that there was no real evidence that the condition then existing was actually one

of leishmaniasis, and that it was possibly due to tubercular disease having been grafted on to Oriental sore. [The reviewer in a report on Oriental sore in Bagdad (1911) pointed out that certain cases of the disease resembled lupus.]

C. M. W.

i. Parrot (L.) & Donatien (A.). **Un nouveau cas sporadique de bouton d'Orient sur le littoral algérien.**—*Bull. Soc. Path. Exot.* 1922. June 14. Vol. 15. No. 6. pp. 410–412.

ii. Pospelow (W. A.). **Beitrag zur Therapie der Leishmania cutanea.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1922. Vol. 26. No. 7. pp. 202–205. With 1 plate.

iii. Fox (Howard). **Two Cases of Oriental Sore (Cutaneous Leishmaniosis).**—*New York Med. Jl. & Med. Record.* 1922. Oct. 4. Vol. 116. No. 7. pp. 365–367. With 2 text figs.

i. The title sufficiently indicates the contents of this paper.

ii. The paper is a record of the author's experiences with seven cases of Oriental sore in people who had returned to Moscow from S.E. Russia. Treatment by the application of CO_2 snow gave the best results.

iii. A record of two cases of Oriental sore in America, the one in a boy who had come from Aleppo and the other in a clergyman from Persia.

C. M. W.

Breda (Achille). **La bouba brasiliana è una leishmaniosi guaribile mediante il tartaro stibiato.**—*Gior. Ital. d. Malattie veneree e d. Pelle.* 1920. Vol. 61. No. 3. pp. 306–310.

Verrotti (G.). **Un nuovo caso (7°) di boubas brasiliano (malattie del Breda) con localizzazione al labbro superiore alla narice destra e al cavo orale.**—*Ibid.* pp. 310–312.

The first of these two papers gives an account of two patients who presented themselves for treatment in Italy after returning from South America, where they had acquired a leishmania infection of the skin and nasal and buccal mucosae. They were cured by injections of tartar emetic.

The second paper describes another similar case.

C. M. W.

AMOEBIASIS AND DYSENTERY.

Amoebiasis.

Billinghurst (W. B.). **Amoebic Dysentery.**—*China Med. Jl.* 1922 July. Vol. 36. No. 4. pp. 287–297.

Dysentery is, and always has been, the most prevalent of all serious diseases to which the foreigner in Shanghai is liable. It invariably heads the list of admissions to hospital. From analyses made from hospital reports the following statistics are available :—

Period.	Mortality from Dysentery.	Percentage of Liver Abscess to Dysentery Cases.
1870–1880 ..	18·47 per cent. ..	16·86 per cent.
1881–1891 ..	13·54 ,, ..	—
1891–1900 ..	8·6 ,, ..	16·38 ,,
1905–1911 ..	5·35 ,, ..	10·56 ,,
1913–1920 ..	2·66 ,, ..	2·66 ,,

The regular and marked diminution in the mortality from dysentery and in percentage of cases leading to liver abscess are entirely due to improved methods of treatment, especially directed to the destruction of the *Entamoeba histolytica*. It is therefore concluded that amoebic dysentery is, and always has been, the prevalent form in Shanghai.

The remainder of the paper discusses the familiar lines upon which the different phases of dysentery should be treated: mention is made of acute toxic or fulminating cases, but these are not especially attributed to bacillary infection.

P. H. Manson-Bahr.

Smits (J. C. J. C.). **Surgical Aspects of Amoebic Colitis.**—Reprinted from the *Trans. 4th Congress Far Eastern Assoc. Trop. Med.* 1921. Mar. 29 pp.

Amoebic dysentery may persist, in spite of emetine, E.B.I., and rectal injections of amoebicidal solutions. We have, therefore, been led to consider surgical operations, in regard to which it must be remembered that the infection prevails in the caecum and ascending colon, and that the ulcerative process should be attacked either by appendicostomy or caecostomy. In 1912 the author began to treat refractory cases by appendicostomy and irrigations through the appendix.

After appendicostomy a catheter is introduced, and the colon is flushed viâ the anus, with a litre of tepid soda solution. After this the intestines are rinsed out with a litre of silver nitrate solution and the treatment continued during one or two months. In 12 cases in which the operation was performed the good effects have been permanent in 8; in 4 either a relapse or reinfection occurred.

Lavage of the ulcerated gut and necessary rest for the colon are best obtained by caecostomy. What we want is a double opening in the gut with a good spur of mucous membrane between them ; this is best obtained by making an artificial anus as follows :—

Under local novocain-adrenalin anaesthesia, the abdomen is opened and the intestine is brought out of the wound in a loop and sutured to the fascia and peritoneum. The mesentery is punctured, a small opening made and a strip of iodoform gauze inserted. The gut after clamping is then opened and two Paul's tubes inserted, one into the afferent, the other into the efferent loop of gut. For six weeks subsequent to operation the bowel is regularly washed out with amoebicidal solutions and the washings examined with regularity to make certain that the parasites are being expelled. A further period of four weeks must elapse after removal of the Paul's tubes before complete healing has taken place. The spur of mucous membrane is removed by Dupuytren's enterotribe. In 16 cases treated in this manner the results were favourable.

Intestinal haemorrhage, which may be rapidly fatal in amoebic dysentery, should be regarded as an indication for operation ; in this case a simple caecostomy with a wide opening in the gut should be performed ; ligature of the bleeding vessel is obviously impossible, but haemorrhage can be controlled by means of lavage with a solution of permanganate of calcium. The author has now operated six times in such cases ; there were four deaths.

P. H. M-B.

Reed (Alfred C.). **The Diagnosis and Treatment of Amebic Colitis.**— *Amer. Jl. Med. Sci.* 1922. Oct. Vol. 164. No. 4. (No. 607.) pp. 587–594.

Dysentery can be divided into :—

1. Dysenteries of bacterial origin.
2. Dysenteries associated with definite diseases, such as tuberculosis and syphilis.
3. Dysenteries due to toxic substances, such as mercury and arsenic.
4. Dysenteries due to irritants, such as, in the Orient, chopped pig bristles and bamboo spicules.
5. Dysenteries due to animal parasites ; in this group are the dysenteries of kala azar, pernicious malaria, and trematode infections, as well as ciliate and flagellate dysenteries, and finally amoebic dysentery.

Due to its widespread distribution, amoebic dysentery has ceased to qualify as a strictly tropical disease during the last few years. In the United States it has become prevalent in all sections ; the factors which are said to have influenced its recent increase are (1) the return of soldiers after the war, (2) increased migration and travel, and (3) the influx of foreign elements into American agricultural and rural districts.

In his treatment of amoebic dysentery, the author does not deviate from the usually accepted standards ; he gives, however, together with ipecacuanha in the chronic stage of the disease, an injection of 0·3 gm. neosalvarsan intravenously and an irrigation of a gallon, if possible, of 1 : 2,000 thymol solution at body temperature ; he gives also emetine-bismuth-iodide.

P. H. M-B.

Bressot (E.). **Les abcès amibiens du foie.**—*Presse Méd.* 1922. Sept. 2. Vol. 30. No. 70. pp. 757–759.

This paper is based upon the author's experience of amoebic abscess in the hospital at Rabat, Morocco. French, Algerians, Spaniards and Moroccans were numbered in this series. In nine instances hepatitis supervened at the close of an attack of dysentery ; in five in association with gastro-intestinal disturbance and chronic diarrhoea ; in two the patients denied the existence of previous dysentery. *Entamoeba histolytica*, or its cysts, was present in 45 per cent. of cases.

Localized hepatic pain was present in five cases ; more usually—in 12 cases—the subjective symptom was a radiating pain in the right shoulder, the special seat being subclavicular, acromio-clavicular or subspinous, according as the abscess was anterior, median, or posterior in position. Enlargement of the liver itself takes place in the first few weeks of the disease, but in the case of small abscesses it is often inappreciable. In large abscesses the intercostal spaces actually were seen to bulge, the hypertrophy of the liver being due more to congestion than to the size of the abscess. A small degree of icterus was observed on five occasions.

The usual diagnostic laboratory tests should be supplemented by radiography. The stretching of the dome of the diaphragm is of special value ; normally the right cupola should surpass the left by 2 cm., but in the case of right lobe abscess this figure may attain 6 or even 10 cm. The line of opacity may become irregular and the diaphragm may be immobilized. Exploratory puncture should be made at the point of maximum tenderness, and 10 or even 15 attempts may be made, under ethyl chloride anaesthesia, without danger. In four instances the abscess was found in the left lobe and in 23 in the right. Twenty-three abscesses were single and three multiple.

The author does not believe that emetine therapy is able to abort the progress of amoebic abscess, but that surgical interference should always be insisted upon. In 17 cases the route chosen was the posterior transpleural thoracic, twice the anterior thoracic and seven times the abdominal. In the latter case death is apt to occur from peritonitis ; this, however, can be avoided by shutting off the abdominal cavity and withholding lavage till after the third day.

Curettage of the abscess wall is considered a dangerous proceeding and liable to cause haemorrhage. In 11 cases emetine therapy, extending over two months at least, was adopted as an after cure.

The author believes that intravenous injections of novarsenobenzol, four of 0·3 gm. each per month, are efficacious, and that the association of emetine with this drug alleviates the general condition and favours cicatrization. As regards prognosis, a pulse-rate of 100–120 forty-eight hours after the operation should cause anxiety. There were five deaths in this series of 26 cases. Multiple abscesses account for the majority, but the difficulty in making a diagnosis in these cases is recognized.

P. H. M-B.

Jelambi (R.). **Influencia de la emetina en la disminución de los abscesos hepáticos en Caracas.** [The Influence of Emetine in reducing Hepatic Abscesses in Caracas.]—*Gac. Méd. de Caracas.* 1922. Aug. 31. Vol. 29. No. 16. pp. 193–198.

For the agenda of the Venezuelan Medical Congress in 1921 Dr. Jelambi asked surgeons of note the question : " How many cases of

liver abscess have been operated upon by you, and how many have you treated by Rogers's method since 1913?" Thirteen sent replies and all spoke very highly of the results obtained by the second method (*i.e.*, aspiration of the pus followed by local injection of emetine hydrochloride).

Statistics are also given from the records of the Vargas Hospital showing the reduction in the number of cases of liver abscess requiring operation before and after the introduction of emetine. From 1907 to 1913 there was an average of 17·7 operations. In 1914 the number was only five, and from that year to 1919 inclusive there have been only 28 altogether [another more detailed table brings the total to 30] and only one in each of the last two years. In 1919 there were nine, but this the author ascribes to the difficulty of obtaining emetine owing to the war. The paper terminates with a eulogy of Sir Leonard Rogers (who, it is hoped, will recognize himself under the title of "The Wise Man of Calcutta").

H. Harold Scott.

Monge (Carlos). **Sobre clasificación de las hepatitis inflamatorias con motivo de un caso de hepatitis intersticial amebiana. Comunicación presentada a la "Asociación Peruana para el Progreso de la Ciencia."** [The Classification of Inflammatory Conditions of the Liver suggested by a Case of Interstitial Hepatitis of Amoebic Origin. Communicated to the Association for the Progress of Science in Peru.]—*Crónica Méd.* 1922. Apr. Vol. 39. No. 706. pp. 139–143.

N. N., a male, 32 years of age, had suffered for eight months from diffuse pain in the liver, with marked loss of weight, periodic mucous diarrhoea and fever. Owing to the size of the liver, which occupied the epigastric, right hypochondriac and iliac regions, a diagnosis of liver abscess had been made four months previously, but, when repeated punctures failed to reveal pus, the case was considered as carcinoma of the liver.

When seen again, four months later, the patient had lost 30 lb. in weight, and the pain was very severe. Blood examination gave the following results: Red corpuscles, 2,460,000; leucocytes, 9,000, of which 74·5 per cent. were polymorphonuclears, 8·8 per cent. myelocytes, 8·8 per cent. mononuclears, and 7·9 per cent. lymphocytes. The stools contained amoebic cysts. He was given emetine in one-grain doses. Improvement was rapid; the temperature became normal, pain disappeared, he put on weight, the red cells increased to 3,870,000 in 19 days, and at the end of a month the liver had returned to the normal limits.

The author states that as the spleen enlarges in malaria, so the liver may show a correspondingly great increase in size in amoebic conditions without pus formation, and he therefore suggests that in place of Barker's division of hepatopathies into inflammatory, degenerative, parasitic, neoplastic, and so forth, a better classification would be into:—

1. *Acute hepatitis.*—(*a*) Simple; (*b*) Interstitial; (*c*) Suppurative.
2. *Icterogenic hepatitis.*—(*a*) Spirochaetal; (*b*) Yellow fever; (*c*) Infective bacillary jaundice; (*d*) Yellow atrophy.
3. *Chronic hepatitis.*
4. *Tuberculosis of the liver.*—(*a*) Chronic hyperplastic perihepatitis; (*b*) Cirrhosis.
5. *Syphilis of the liver.*
6. *Toxic hepatitis.*

[Classification of the pathological conditions of the liver is notoriously unsatisfactory, but such a curious arrangement as that suggested can, under no circumstances, be regarded as a "classification," and most men will say that "the old is better."]

H. Harold Scott.

Bon (G. J.). **De verschuiving volgens Arneth voor de differentiale diagnose tusschen leverabsces en levergumma.** [The Arneth Index for the Differential Diagnosis between Liver Abscess and Liver Gumma.]—*Nederl. Tijdschr. v. Geneesk.* 1922. Vol. 66. Pt. 2. No. 5. pp. 432–438.

Two cases are quoted to prove the considerable value of the Arneth index in doubtful cases. In one the patient was twice operated on for abscess of the liver. Return of the symptoms suggested another relapse, but the shift to the right in the neutrophile leucocytes induced the author to take heed. The Wassermann test was found to be strongly positive and antisyphilitic treatment freed the patient of his complaint.

W. J. Bais.

Maunsell (E. C. C.). **A Case of Liver Abscess which had ruptured into the Abdominal Cavity.**—*Indian Med. Gaz.* 1922. Sept. Vol. 57. No. 9. p. 340.

This case presented all the signs of intestinal obstruction; a definite and painful mass could be palpated with difficulty passing upwards towards the liver. On opening the abdomen general peritonitis and a ruptured right hepatic abscess was discovered; subsequently a second hepatic abscess was evacuated by aspiration between the sixth and seventh ribs in the anterior axillary line. The patient made a good recovery.

P. H. M-B.

Reinhold (C. H.). **Traitement moderne des abcès du foie des pays chauds.**—*Bruxelles-Médical.* 1920. Dec. 15. Vol. 1. No. 2. pp. 53–55.

There appear to be no original observations in this paper, though it presents a good clinical description of the disease. The author speaks mainly from experience gained during the war. He states that in Egypt the majority of cases of hepatic abscess in natives hail from districts where a considerable amount of "arak" is consumed, and he wishes to emphasize that the introduction of emetine has removed the treatment of hepatic abscess from the sphere of the surgeon to that of the physician.

P. H. M-B.

Escomel (E.). **Vingt-cinq d'abcès hépatique amibiens guéris par l'émétine, sans intervention chirurgicale.**—*Bull. Soc. Path. Exot.* 1922. July 12. Vol. 15. No. 7. pp. 537–540.

The author is a great believer in the efficacy of emetine; he thinks that not only are the entamoebae exterminated by the action of emetine, but that also the red blood corpuscles are in some way altered,

so that they are no longer capable of nourishing these organisms when ingested by them.

In cases of hepatitis or hepatic abscess he is of the opinion that, should immediate improvement not result after 2 cgm. of emetine the diagnosis has not been correct. The injections should be made intravenously whenever possible and the patient should remain recumbent for 15 minutes. After the thirtieth injection in a case of hepatic abscess the condition is completely and entirely cured. It is no longer necessary to drain off or aspirate the pus.

P. H. M-B.

IZAR (Guido). **Forme rare di amebiasi latente e cronica. (Nota iii.)** [Rare Forms of Latent and Chronic Amoebiasis.]—*Riforma Med.* 1921. Mar. 26. Vol. 37. No. 13. pp. 292–294.

Observations in Sicily agree with those made by LABBÉ in France in confirming the thesis that the dysentery amoeba is not uncommonly the cause of severe gastro-intestinal disturbances. Owing, however, to the fact that dysentery is considered an acute tropical disease, the diagnosis is often overlooked. In reality, dysentery, like other protozoal diseases, is typically chronic, the acute form being a non-essential episode. Professor Izar describes cases to illustrate the resemblance which chronic dysentery may bear to tuberculous enteritis and appendicitis. When tuberculous enteritis is suspected a careful history of the intestinal disturbances and frequent coprological examinations will assist the differential diagnosis. It must not be forgotten that besides pseudo-appendicitis there may be a true appendicitis resulting from dysenteric ulceration of the appendix.

An acute amoebiasis may result from the administration of a saline purgative to a carrier. It seems that any slight intestinal disturbance may result in the implantation of the amoeba in the intestines of such people who should perhaps be spoken of as the subjects of that latent amoebiasis.

J. Rosslyn Earp.

LAMBRIGHT (George L.). **Hodgkin's Disease following Dysentery: Recovery of Parasites from Stool and Improvement with Anti-parasitic Treatment.**—*Jl. Amer. Med. Assoc.* 1922. Sept. 2. Vol. 79. No. 10. pp. 809–810.

Following upon KOFOID's announcement of *E. histolytica* in the lymphatic glands in Hodgkin's disease [see this *Bulletin*, Vol. 19, p. 685], Lambright reports the following case :—

The disease occurred in a man, 30 years of age, with no tubercular history, but with enlarged brawny cervical glands. X-rays demonstrated two large glands at the root of the right lung. In the faeces, the presence of *E. histolytica* and two intestinal flagellates was demonstrated by KOFOID and his associates. On antiamoebic treatment (neoarsphenamin in 0·9 gm. doses intravenously, emetine hypodermically and ipecacuanha in pills by the mouth), he gained 4 lb. in weight in one week and his pyrexia was reduced ; the cervical glands also became reduced in size.

[The evidence afforded is not convincing that antiamoebic treatment exerted any lasting benefit on the glandular enlargement.]

P. H. M-B.

MACGREGOR (A. S. M.) & FREW (J.). **Treatment of Amoebic Dysentery by Alcresta and Emetin.**—*Glasgow Med. Jl.* 1922. Aug. Vol. 98. (N.S. Vol. 16.) No. 2. pp. 114–117.

Alcresta, exhibited alone or as an adjuvant to emetine, was introduced from America a few years ago. Alcresta tablets contain the alkaloids (emetine and cephaelin) from 10 gr. of ipecacuanha held in suspension by hydrated aluminium silicate.

Since April, 1921, fifteen cases have been treated, in eight of which the diagnosis was symptomatic. Alcresta was exhibited in 30-gr. doses per diem together with hypodermic injections of 1 gr. of emetine, a combined course of this kind being equivalent to 20 gr. of emetine—10 orally and 10 hypodermically. After an interval of a week a second similar course of treatment is given, and may be followed by a third. The cases recorded were all examples of old-standing chronic infections, for which treatment had hitherto been of little avail. In only two patients of the series (that is, out of seven in whom the *Entamoeba histolytica* was found at the commencement of treatment) could the results be considered permanently satisfactory.

The improvement which resulted in the other cases appeared to be only temporary.

P. H. M-B.

CAWSTON (F. G.). **Emetine Injections.** [Correspondence.]—*Brit. Med. Jl.* 1922. Oct. 7. p. 661.

The pain commonly resulting from emetine injections can be avoided by using only reliable preparations of the drug, by giving it intramuscularly and by dissolving the tablet in 1 per cent. carbolic immediately before injection. The weak carbolic does not alter the character of the drug and is certainly very gratifying to the patient.

P. H. M-B.

MELLO (Silva). **O tratamento das dysenterias amibianas chronicas pelo Yatren.**—*Brazil Medico.* 1922. July 22. Year 36. Vol. 2. No. 29. pp. 45–49.

An account of the author's experience in the treatment of amoebic dysentery by Yatren, an iodine derivative of benzol-pyridine, containing 30 per cent. of iodine. Clinical histories are given of six cases treated. All had proved entirely refractory to emetine and other treatment, but, in all, Yatren, administered in enemata or by the mouth, brought about cure, the rapidity and completeness of which the author describes as "truly surprising." The dosage was, per os, 1 gm. three times daily; as enema, 10 gm. in 200 cc. of water. Reference is made by the author to an article by MÜHLENS and MENK on Yatren treatment [this *Bulletin*, Vol. 19, p. 31].

F. S. Arnold.

MENK (W.). **Weitere Erfahrungen ueber die Beeinflussung infektiöser Darmkrankheiten durch "Yatren," mit besonderer Berücksichtigung der chronischen Amöbenruhr.**—*Muench. Med. Woch.* 1922. Sept. 1. Vol. 69. No. 35. pp. 1280–1282.

The author has been experimenting with Yatren as an adjunct to emetine and E.B.I. treatment of resistant cases of amoebic dysentery. In three cases Yatren has proved quite successful; but only a thorough

course lasting 5–6 weeks should be undertaken, and it should be continued even after the return of the stools to the normal. It is even recommended that treatment should be repeated at six-month intervals and kept up on each occasion for a month. [For details of original Yatren treatment, see this *Bulletin*, Vol. 19, p. 31.]

P. H. M-B.

Beijnen (G. J. W. Koolemans). **Calomelbehandeling bij hardnekkige amoebendysenterie.** [Calomel Treatment in Obstinate Amoebic Dysentery.]—*Nederl. Tijdschr. v. Geneesk.* 1922. Vol. 66. Pt. 2. No. 4. pp. 408–414.

This is a preliminary communication. It recommends, in cases of failure of the usual treatment, calomel in doses of 0·03 gm. 12 times per day for three days, followed by three days' treatment with bismuth subnitrate (0·5 gm. 12 times). Two cases are quoted, one with very good clinical results, but relapse after three months, the other with complete cure in respect of definite disappearance of the amoebae.

W. J. Bais.

da Costa (Aristides Candido) & Silva. **Sobre um novo tratamento das disenterias amibianas.**—*Rev. Méd. de Angola.* 1921. Nov. No. 2. pp. 213–215. With 3 charts.

The author acted as one of the medical staff of the Loanda Hospital from May to September, 1921. During the earlier part of that period most of the cases of "dysentery" or "diarrhoea" terminated fatally. This the author ascribes to the fact that the hospital was without any emetine hydrochloride. Early in June the author, finding the older traditional treatment (bismuth salts, internal disinfectants, ipecacuanha, etc.) ineffectual, commenced to treat his patients by administering to each three enemata daily, as follows:—

1. One litre of solution of sulphate of soda (2 per cent.).
2. One litre of solution of chloride of calcium (4 per 1,000).
3. One litre of solution of permanganate of potash (1 in 4,000).

The enemata were given warm and the second only after complete evacuation of the first. The results were "brilliant" as compared with what had gone before, but the method was gradually modified, the form finally adopted being thus described:—

Administration by mouth or enema of normal saline solution.

Diet of rice water and *in many cases* milk.

One enema daily of a litre of solution of permanganate of potash with 4 gm. of pure chloride of calcium dissolved in it. This method brought about the cure of the great majority of the cases of dysentery and of all those classed as diarrhoea.

F. S. Arnold.

Cauchemez (L.). **Présence d'amibes non iodophiles chez des porcs français.**—*Bull. Soc. Path. Exot.* 1922. June 14. Vol. 15. No. 6. pp. 390–393. With 1 text fig.

The author in the course of last year examined at least 300 "porcine dejections" and frequently found in them an iodamoeba [this *Bulletin*, Vol. 19, p. 25]. He now describes and figures a non-iodophil amoeba which he has observed in pigs' faeces and has localized in the animal's

rectum and contiguous part of the colon. He identifies this amoeba with a species discovered in the pig in America by SMITH (*Journ. Med. Res.*, Vol. 23, 1910, p. 423) ; and observed in faeces of a pig from the Marianne Isls. by PROWAZEK and named by him *Entamoeba polecki* (*Arch. f. Protist.*, Vol. 25, 1912, p. 273) ; also observed by HARTMANN, who named it *E. suis* (Handbuch der Path. Mikroorg., 2nd Ed., Vol. 7, 1913, p. 607) ; and in Hamburg pigs by NÖLLER (*Arch. f. Schiffs- u. Trop.-Hyg.*, 1921, No. 2), who remarked on its resemblance to *E. histolytica*, a resemblance to the *minuta* form of which the author also recognizes. No pathological significance is at present to be attributed to this amoeba (*E. polecki*).

A. Alcock.

SCALAS (Luigi). **Contributo allo studio della deviazione del complemento nella dissenteria amebica.** [Complement Deviation in Amoebic Dysentery.]—*Riforma Med.* 1921. Jan. 29. Vol. 37. No. 5. pp. 103–104.

There would be obvious diagnostic advantages in a reliable complement fixation test for dysentery if such could be shown to be practicable. The writer finds that this test is positive in known cases of dysentery, as was found by IZAR (*Ann. di Clin. Med.*, 1914, May 15, Vol. 5, No. 2 & 3), but his method differs from the latter's in that he uses only mucous flakes in the preparation of his antigen instead of using an aqueous extract of unselected faecal matter. Four cases of known diagnosis were examined. In the first two cases of long standing amoebic dysentery the test gave a clearly positive result. The third case tested was a mild case of amoebic dysentery of eight months' duration. It was not found possible to prepare an antigen from the faeces in this case, the antigen prepared in the former cases was therefore used and a positive reaction obtained. By way of control this antigen was replaced by one prepared from mucus passed by a patient with a bacillary dysentery and the reaction was then negative. Finally, negative results were obtained with the serum of the patient suffering from bacillary dysentery and an antigen prepared from Shiga bacilli, also with normal serum and the same antigen, but a positive result with the patient's serum and an antigen prepared from mucus of the patient's stools. This research is to be continued.

J. Rosslyn Earp.

i. IZAR (G.). **La forma clinica cachettizzante dell' amebiasi latente.**—*Riforma Med.* 1921. Jan. 22. Vol. 37. No. 4. pp. 73–75.

ii. CHATTERJI (K. K.). **Surgical Aspects of Amoebiasis.**—*Indian Med. Gaz.* 1922. Sept. Vol. 57. No. 9. pp. 333–337. With 1 plate.

iii. ILOWAISKY (S. A.). [In Russian. Abridged Version in German.] **Zur Kenntniss der Amöben aus dem Leberabszess bei der Dysenterie.**—*Rev. Microbiol. et Epidemiol.* Saratov. 1922. Vol. 1. No. 2. pp. 184–186. With 4 plates.

iv. KITAEFF (F. J.). [In Russian. Abridged Version in German.] **Ein Fall des Amöbengeschwürs der Leber.**—*Rev. Microbiol. et Epidemiol.* Saratov. 1922. Vol. 1. No. 2. p. 184.

i. Two cases of latent amoebiasis with cachectic symptoms are described. In such cases the amoeba subsists in the submucosa of the intestine and possibly in other tissues, causing no acute symptoms, but serious anaemia and general intoxication. Both cases exhibited " hypoadrenal phenomena." The first injection of emetine always provokes a rise of temperature more or less marked and may cause exacerbation of intestinal symptoms.

J. Rosslyn Earp.

ii. Little in this paper calls for comment, except one case in which there was an amoebic abscess in the left lobe of the liver, a second in the spleen, and a third, from which death resulted, in the left lobe of the brain near the optic thalamus.

iii. An account of the morphology of *E. histolytica* illustrated with crude drawings. The author bemoans the absence from current literature since the days of Loesch of any accurate description of this organism.

iv. An unrecognized liver abscess burst into the peritoneum, causing general peritonitis, in the pus of which numerous entamoebae were discovered. Death ensued. This is the first case recorded in Saratov.

P. H. M-B.

Bacillary Dysentery.

Nicolle (Charles) & Conseil (E.). **Vaccinations préventives par voie digestive chez l'homme dans la dysenterie bacillaire et la fièvre méditerranéenne.**—*Ann. Inst. Pasteur.* 1922. Aug. Vol. 36. No. 8. pp. 579–613. With 4 charts.

Though according all credit to Besredka for his work on immunization *per os*, the authors have been led to criticize his work in some particulars.

The toxicity of cultures of Shiga's bacillus has, so far, militated against the general adoption of prophylactic inoculation against bacillary dysentery ; this is due to the special endotoxin of B. Shiga and the clinical symptoms of the disease are but an expression of this same necrotic action upon the mucosa of the intestine.

Intramuscular inoculation of 250 million Shiga bacilli heated to 75° C. produces no immediate reaction ; on the fourth day, however, oedema and painful infiltration of the site takes place, with malaise, etc., and the reaction, which much resembles that of antityphoid inoculation, but is more severe, does not pass away till 11 days after, so that the method cannot be used compulsorily in the army. A second inoculation 8–15 days later of 750 million organisms gives a similar violent reaction. It happened in 1915 that a severe epidemic of dysentery, proved by Chatton to be bacillary in origin, had occurred in French troops occupying Southern Tunisia. In order to guard against the recurrence of a similar epidemic in the autumn of 1916, it was decided to institute antidysenteric inoculation on a voluntary basis ; two intramuscular inoculations were given at eight-day intervals, the first of 250, the second of 750 millions, but owing to enemy activity at that time the complete programme could not be carried out ; nevertheless, 1,018 men received one injection. The effects were similar to those already described. Sick leave had, on this account, to be given, and the majority of the aviators were unable to leave Tunis on the appointed day. The ultimate results of this experiment could not be ascertained with accuracy ; the non-recurrence of the epidemic was ascribed to sterilization of the water.

Intravenous injection of dysentery bacilli has been practised intermittently since 1912—using living cultures, by preference attenuated strains. This method has definite advantages, as it approximates most closely to the natural processes of the disease. Four preliminary experiments were made with freshly isolated cultures, 20–75 millions of organisms being injected at a single dose. As a general rule, pretty violent reactions ensue, but the authors conclude that even large doses of living organisms injected intravenously are incapable of reproducing dysentery in man ; the reaction is too acute to render the method suitable for universal adoption, and has nothing to do with the viability

of the bacillus, since it occurs also with dead cultures. Ingestion of ox-bile tablets, it would appear, is useful in mitigating the reaction.

When one comes to the ingestion of dysentery organisms by the mouth with a view to producing immunity, one is met with the difficulty of reproducing bacillary dysentery by these means. Two causes militate against success; firstly, the rapid attenuation of the cultures and, secondly, the natural resistance to infection exhibited by the native Tunisian. The majority of pathogenic organisms become virulent only when certain conditions are fulfilled.

In five Europeans (three French and two Russians) the authors obtained five positive results, but in 12 natives only one; this is probably due to a gradual process of immunization since childhood. The rectal route, in natives at any rate, proved the least uncertain. Certain strains of dysentery bacilli are more virulent than others; three of the Europeans were successfully infected with strains subcultured over two years. They failed to infect a subject after a dose of 500,000 million organisms (combined oral and rectal route) and succeeded with 25 millions (oral route alone).

In the case of natives, 24-hour cultures, killed by heat at 72–75° C. for one hour, were employed for oral vaccination; sometimes also concentrated extracts of Shiga's bacillus submitted by Besredka. The subjects for experimentation were prepared dietetically for some time previously.

Their limited experience would lead them to believe that in Europeans a certain amount of protection is afforded by the oral method of inoculation. A virulent culture, isolated three weeks previously, was employed. Two non-inoculated subjects absorbed on four occasions 100,000 million of organisms killed by heat (one hour at 72° C.)—in all, 400 milliards. One case contracted bacillary dysentery 15, the other 18, days after ingestion; the two controls, previously subjected to immunization *per os*, exhibited no disturbance of any sort when subjected to the same treatment, and their sera agglutinated the organism in a strength of 1 : 10 and 1 : 20 respectively.

This experience has convinced the authors that one can immunize against dysentery via the digestive route, and also against undulant fever [see this *Bulletin*, Vol. 19, p. 742], so that one can scarcely doubt that this method will prove equally efficacious in typhoid and cholera.

P. H. M-B.

Lins (Abdon). **Sobre os agentes da dysenteria bacillar.**—*Brazil Medico.* 1922. Aug. 19. Year 36. Vol. 2. No. 33. p. 101.

This note is based on systematic experiments to determine the causal agent of the dysentery syndrome in Rio de Janeiro, the material examined (50 specimens of faeces) being obtained from notified cases of dysentery. The following germs presenting specific characteristics were identified from pure cultures :—

1. *B dysenteriae* Shiga (Case No 7).
2. *B. dysenteriae* Flexner (Cases Nos. 13 and 14).
3. *B. pseudodysentericus* Morgan (Case No. 3).

In addition to these known types seven were isolated differing in character from those already recognized.

P. H. M-B.

Aoki (Kaoru). [**Ueber die agglutinatorische Einteilung von Dysenteriebazillen.**]—*Tohoku Jl. of Experim. Med.* 1921. Sept. Vol. 2. p. 142. [Summarized in *Bull. Inst. Pasteur.* 1922. Aug. 15. Vol. 20. No. 15. p. 599.]

The author does not place any reliance on fermentation tests as a means of differentiating dysentery bacilli. Of 43 strains investigated four belonged to the Shiga type ; but all the remainder were " pseudo-dysentery " organisms. After cross-agglutination tests had been performed with sera made from each strain, he managed to distinguish eight groups.

P. H. M-B.

Bergell (Peter) & Bonnin (Leo). **Ueber Ruhr bazillenträger.**—*Deut. Med. Woch.* 1922. Aug. 18. Vol. 48. No. 33. pp. 1098–1100.

Five cases of chronic bacillary dysentery were intensively studied and completely cured by injection of autogenous vaccine. The cases were all due to the Shiga-Kruse bacillus, though in two the serum co-agglutinated Flexner's bacillus as well. Initial doses were small, gradually augmented and given at daily intervals in the ascending scale of 5, 10, 20, 30, 40, 50, 60 millions. The injections were made subcutaneously deep under the skin of the back.

In three cases only after large doses of 40–60 million a reaction set in ; this manifested itself in a rise of temperature, accompanied by malaise and subsequently by the disappearance of the specific bacilli from the stools.

In the cases in whom a co-agglutination to Flexner was also present no reaction was noted till a dose of 180 millions had been reached, when the " Flexner-phenomenon " disappeared. Sharp reactions were noted between 180 and 200 millions.

P. H. M-B.

Hudson (N. Paul). **A Case of Persistent Infection with** *B. dysenteriae* **(Flexner).**—*Jl. Amer. Med. Assoc.* 1922. Nov. 11. Vol. 79. No. 20. pp. 1676–1677.

Both the true carrier of bacillary dysentery and the type of person who is really a chronic case of the disease have been incriminated as spreading dysentery, especially in military organizations. The rarity of the true carrier has led to the view that the convalescent is the dangerous factor in the spread of the disease. The case to which attention is drawn is of special interest because of the relatively few instances of persistent Flexner infections reported in America.

The patient, a student, contracted dysentery in June, 1918 ; since that time he has been subject to intermittent attacks of diarrhoea. In January, 1922, the Flexner-type of dysentery bacillus was isolated from a faecal motion ; the organism was agglutinated in a dilution of 1 : 80 by the patient's serum, five months after the last attack of diarrhoea ; it was also agglutinated to half the titre of specific anti-Flexner serum.

It is suggested that possibly a relation existed between the organism isolated and the appearance of " clay-stools " the patient passed in 1919.

P. H. M-B.

GORDON (Jehoasch). **Beitrag zur spezifischen und medikamentösen Therapie der akuten bazillären Ruhr.**—*Reprinted from Ztschr. f. Krankenpflege.* 1921. July–Sept. Vol. 43. No. 7–9. 26 pp. With 1 chart in text.

A real development of serum therapy in bacillary dysentery took place during the World War. A comprehensive survey is here given, commencing with attempts to produce bactericidal sera (ROSENTHAL, CONRADI, TODD, KRAUS and DÖRR); later developments were directed towards the preparation of antitoxic sera (KOLLE and others).

Since the introduction of serum therapy the death-rate has greatly decreased. SHIGA in 1903 reduced it from 22 to 7 per cent., ROSENTHAL from 17·5 to 4·5; KRAUS (1912) from 19·2 to 9·65. As regards the dosage the optimum amount has progressively increased with more extensive experience. SHIGA recommended 10–100 cc.; RUFFER and WILLMORE, 100–320 cc. in serious cases; SCHITTENHELM, 220 cc. The object is to neutralize the toxins circulating in the blood and to kill off, if possible, the organisms in the intestinal mucosa. The consensus of opinion on the German side during the war is that good results were obtained.

SCHITTENHELM gives the following figures for 1916:—

	Dysentery. Cases.	Deaths.	Percentages.
(1) For Field Ambulance—			
Number of Cases treated without serum	541	25	4·6
Number of Cases treated with serum	3,219	43	1·3
(2) For Base Hospital—			
Number of Cases treated without serum	570	11	2·0
Number of Cases treated with serum	434	2	0·5

Other observers give the following figures: BEYER, 3·75 per cent. death-rate; MEYER, 5·8, and SCHARF, 1·96. Of course, in severe clinical cases it is greater.

The action of the serum on the intestinal symptoms seems to be pronounced; both objective and subjective symptoms immediately improve. SCHITTENHELM gives other statistics showing that of serum-treated cases 92 per cent. were cured in four weeks, with less favourable results in cases treated by medicinal means. The majority are in favour of the intramuscular and subcutaneous route rather than the intravenous.

A review is given of vaccine therapy combined or not with serum from authors whose papers have been adequately noticed in this *Bulletin*. There is also a dissertation upon the general medicinal management of a case which calls for little comment.

[This paper, as a whole, constitutes a very fair literary review of the subject, but contains little, if any, original matter.]

P. H. M-B.

DE BIEHLER (Mathilde). **Sérothérapie dans la dysenterie infantile.** —*Arch. Méd. des Enfants.* 1922. Aug. Vol. 25. No. 8. pp. 464–477.

Encouraged by the results of serum therapy in dysentery, the author began to treat children in this manner in 1915. At first she was disposed

to postpone serum therapy till the case had been diagnosed bacteriologically, but once convinced of its efficacy she has employed it in every case diagnosed on clinical grounds. One hundred and twenty nine cases passing sanguino-mucous stools were for the most part benign, but there were 21 grave cases, three of which were *in extremis* when first seen. The serious cases presented the familiar phenomena of incessant diarrhoea (20–60 stools a day), strangury and rectal prolapse. As regards complications, there was one case of noma, seven of nephritis and four of pyelitis. The injection of serum was unaccompanied by any accidents ; sometimes a scarlatiniform eruption ensued at the site of injection on the trunk or limbs, or on the abdomen. The absence of reaction is attributed to the administration of calcium chloride. Usually 20 cc. were injected ; 60 or even 80 cc. were given in grave cases. The serum was a polyvalent one. Three deaths were recorded in the 129 cases. Two when first seen were *in extremis* ; the third was a case of noma. A notable improvement was generally observed 24 hours after injection ; in 36 the child was happy and laughing ; 78 were boys and 51 girls ; in age they ranged from 4 months to 19 years, the majority between 4 and 8 years.

In conclusion, she is of the opinion that serum therapy should not be neglected ; it is a remedy of first-rate importance.

P. H. M-B.

Matsuo (Iwao) & Izawa (Tamekichi). **A Contribution to the Classification of the Dysentery Bacillus.**—*Acta Scholae Med. Univ. Imperialis in Kioto.* 1922. Vol. 4. No. 4. pp. 571–581.

Classification of dysentery bacilli based upon sugar reactions alone has long been recognized. Some investigators lay chief stress upon agglutination, but most are agreed that on account of group agglutination it is difficult to distinguish the Y from the Flexner type. It is possible to change the Y type into the Flexner type and a type (C type, Basugi) which, like *Bacillus coli communis*, is capable of splitting lactose. From 25 days to 3 months is required to produce this new character and culture in an unsuitable medium. The Y type of dysentery bacillus was isolated fresh from faeces and cultured in an inorganic medium which contained 1 per cent. of maltose, lactose, saccharose and dextrin respectively. After 25–90 days any strain of Y type was able to ferment maltose and lactose ; some were able to ferment saccharose and dextrin, others not. From the serological and immunological point of view the new Y type was identical with the original strain, but morphologically it changed, becoming more slender and less active in Brownian movement. From the classification point of view the fact that, judged on sugar reactions alone, the Y type could be changed into a Flexner type and a lactose-fermenter must be taken into consideration.

P. H. M-B.

Breinl (Friedrich). **Variationsercheinungen in der Dysenteriegruppe.**—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1. Teil. Orig. 1922. Vol. 35. No. 1–2. pp. 176–190.

These researches have been undertaken with three toxic and four atoxic strains of dysentery bacilli. Two of the toxic strains, when grown for a considerable period in broth, produced variants. The variant colonies can be distinguished at sight : in one case, that of the type, they are clear and transparent ; in the other, that of the

variant, they are of a yellow colour, opaque and granular. However, these grosser characters appear to be evanescent and not to express themselves in antigenic differences. Some colonies showed a tendency to spontaneous agglutination, but this property also does not appear to persist.

This variability even affects the morphology of the organisms. The individual bacilli of the original culture are large thread-like rods; those of the variant, small, oval and plump. The sugar reaction, typical of Shiga's bacillus, remained unaffected and they are agglutinated to a greater or smaller extent by the specific Shiga serum of a titre 1 : 5,000. Of the 16 cultures tested out in this manner half behaved as a typical Shiga-Kruse bacillus should, while the other half, being spontaneously agglutinable, was not affected by the different serum concentration. Absorption tests were undertaken to ascertain whether the auto-agglutinability was in any way connected with variation in antigenic properties, and it was found that five strains had undergone such profound changes that the receptive mechanism in complement deviation had become altered.

The effect of homologous sera prepared from rabbits demonstrated that this was so; an immune serum prepared with one variant failed to bind complement in the presence of the heterologous antigen, when one of these specially prepared rabbit sera was used as an amboceptor. The differentiation of the variants one from another was still further brought out by these experiments.

The atoxic cultures investigated in the same manner produced also a number of variants.

The author believes that this work sheds great light upon the occurrence of spontaneous outbreaks of bacillary dysentery in war-time—that atypical and even gas-forming organisms, may become, under certain circumstances, transformed into true dysentery bacilli.

[This is a long technical and somewhat involved dissertation, with numerous tables, to which it is difficult to do justice in a summary. It should be consulted, therefore, in the original.]

P. H. M-B.

Szymanowski (Z.) & Szereszewski (L.). [In Polish and German.] **Przyczynek do zmienności bakteryj czerwonkowych. Beitrag zur Variabilität der Ruhrbacillen.**—*Przegl. Epidemjol.* Warsaw. 1922. Vol. 2. No. 2. pp. 201–222. (German summary pp. 222–223).

During the summer of 1920, strains of organisms were cultured from typical cases of dysentery which were agglutinated neither by Shiga nor by Flexner antisera and, being non-toxic for rabbits, were thought to be in close affinity to the bacillus of Schmitz. It was a remarkable fact that the 12 strains isolated were, after subculture for 2–3 weeks, agglutinated by a "Strong" serum. Unexpected results were obtained by observing the variability exhibited by four strains over a period of eighteen months. The organisms were educated to ferment mannite and maltose without and with gas formation; when they reached this stage they were agglutinated by paratyphosus B and C sera.

P. H. M-B.

Robertson (R. Cecil). **The Toxins of** *B. dysenteriae* **Shiga.**—*Brit. Med. Jl.* 1922. Oct. 21. pp. 729–730.

The author has confirmed in the main the observations of Olitsky and Kligler upon the toxins of *B. dysenteriae* (Shiga) [see this *Bulletin*,

Vol. 16, p. 18], but it has been found impossible to produce endotoxin without concomitance of a considerable quantity of the neurotoxin, or exotoxin. Although two definite toxins for animals may be produced by Shiga bacilli, yet there is considerable evidence that the neurotoxin or endotoxin has a secondary action on the intestine through the initial inhibition of peristalsis. The oral administration of living Shiga bacilli to rabbits does not produce either dysentery or any demonstrable serological reaction in the blood; the toxicity of dried Shiga bacilli is not affected by treatment with acetone or the subjection to 100° C. for twenty minutes. The various means of producing detoxication depends upon the maceration of the bacillus with a strong alkali, subsequent neutralization and precipitation. Detoxication affords a means whereby active immunization of animals may be produced; the intradermal reaction is not severe and large subcutaneous doses may be given without severe disturbance.

P. H. M-B.

KANAI (S.). **Further Experimental Studies on Immunization against *B. dysenteriae* (Shiga) and its Toxins.**—*Brit. Jl. Experim. Path.* 1922. June. Vol. 3. No. 3. pp. 158–172.

The main object of the author's experiment, to determine the degree of local immunity in the intestinal mucosa produced by the ingestion of dysentery bacilli, was not achieved.

No strain of *B. dysenteriae* (Shiga) was found which, when inoculated into rabbits, gave rise to intestinal lesions to the exclusion of other pathological changes, and, secondly, all attempts to separate endotoxin from exotoxin proved useless. It is only necessary to suspend an agar culture in normal saline and to remove the bacilli by centrifugation to obtain a highly toxic fluid. This soluble fraction produces only the same lesions as the whole bacilli, and when heated for one hour at 80° C. all toxicity was lost.

The toxin of Shiga's bacillus affects in rabbits principally the central nervous system and at the same time produces congestion and haemorrhage in the various viscera. Exposure for one hour to the temperature of 80° C. much reduces its toxicity, especially for the central nervous system. Though there is some indication that oral immunization produces a local immunity in the intestinal wall, this point remains undecided. The oral administration gives rise to a less general reaction than does inoculation subcutaneously. The antibody titre of the serum of rabbits immunized *per os* is appreciably raised by repeated ingestions. Attempts to secure a solid active immunity against the potent soluble toxin of *B. dysenteriae*, when intravenously administered, have not been attended with such striking success as when active immunity has been procured by live bacilli similarly administered.

P. H. M-B.

DAVIES (Arthur). **An Investigation into the Serological Properties of Dysentery Stools.**—*Lancet.* 1922. Nov. 11. pp. 1009–1012.

The object of this investigation was to ascertain whether the intestinal exudate in bacillary dysentery stools would contain specific antibodies to specific dysentery bacilli. In the cases earliest obtained both

blood serum and intestinal exudate were examined for agglutinins, which were found to be absent from the former, but present in the latter. So far as could be ascertained the stools were derived from cases in the first week of their illness.

The stools were treated in different ways: either the fluid portion was pipetted off, or the blood and mucus were well shaken up with a small quantity of normal saline.

The technique adopted to ascertain the presence and titre of agglutinins was that devised by GARROW. The titre of *B. dysenteriae* Shiga agglutinins was not a high one and varied from 1/10 to 1/80. No agglutinins to B. Flexner were found, nor were these organisms isolated. Investigations were undertaken on these lines to ascertain whether other organisms played a part in the pathology of dysentery, and it was decided to test the agglutinability of non-lactose gas-producing organisms which seemed to suggest that they also may be etiological agents.

In the chronic stage of the disease it was found that the specific agglutinins could be obtained from pledgets of mucus passed by the bacillary, but not from the amoebic cases.

P. H. M-B.

SHIMOJO (Kumaichi). [**On a New Biological Phenomenon that Typhoid and Dysentery Group of Bacilli takes on the Specific Culture Medium.**]—*Eiseigaku Densenbyogaku Zasshi* (*Jl. of Hyg. & Infect. Dis.*). 1922. Apr. Vol. 17. No. 4. [Summarized in *Japan Med. World.* Tokyo. 1922. Sept. 15. Vol. 2. No. 9. p. 271.]

Shimojo, noticing that a turbidity occurs round colonies of these bacilli on agar medium, proved this to be due to acid formation. The medium prepared for their identification consists of glycerin, cholates and litmus agar, and the only species producing reddening are *B. paratyphosus* A, *B. dysenteriae* Shiga and, of course, *B. typhosus*. Thus the medium would differentiate *paratyphosus* A from B, and B. Shiga from other types of dysentery bacilli.

P. H. M-B.

DUMAS (J.) & COMBIESCO (D.). **L'intoxication dysentérique du Cobaye.** —*C. R. Soc. Biol.* 1922. Oct. 21. Vol. 87. No. 30. pp. 942–943.

The guinea-pig is not very sensitive to intravenous or subcutaneous injections with Shiga's bacillus; very exceptionally, lesions typical of bacillary dysentery lead to death.

As a rule, intravenous injection of $\frac{1}{10}$th cc. of Shiga culture causes death in 24 hours. In this series only one out of four animals succumbed. At autopsy the stomach and intestines were congested, the liver degenerated, the kidneys and suprarenals engorged. The organism was recovered from the brain, liver, spleen, kidneys, bile, urine and intestinal contents.

Subcutaneous inoculation of the same dose produced intestinal lesions more resembling the human pathology. Forty-eight hours after the subcutaneous or intravenous inoculations are made, the mucosa of the large gut is most affected.

P. H. M-B.

BAIL (Oskar). **Elementarbakteriophagen des Shigabazillus.**—*Wien. Klin. Woch.* 1922. Aug. 31, Sept. 21 & 28. Vol. 35. Nos. 35, 36–37, 38–39. pp. 722–724; 743–746; 765–768.

The phenomenon of bacterial autolysis is no new one. It has long been known that bacteria undergo this change in artificial culture, one of the best examples of this being the spontaneous clearing which takes place in broth cultures of the pneumococcus. We also know from the work of MALFITANO, EIJKMAN, and others, that certain organisms (*e.g.*, *B. pyocyaneus*, *B. anthracis*) secrete bacteriolytic enzymes, and that others, again, produce auto- and hetero-growth-inhibiting substances. The work of TWORT and D'HERELLE has presented this problem in a somewhat different light, though there is little reason for supposing any fundamental difference between the phenomenon described by them and auto-bacteriolysis as we already knew it. In 1915 TWORT isolated a micrococcus from vaccinia which, when grown on agar, showed a "glassy" or translucent change which commenced at the edge of the colonies. He showed that this "glassy" change could be transmitted to healthy colonies, that it was produced by an agent which passed through filters, and that it increased at the expense of the micrococci which it attacked.

This observation of TWORT's passed almost unnoticed, and it was not until D'HERELLE's communication on the Bacteriophage appeared (1917) that the interest of scientific investigators was arrested. D'HERELLE found that the filtrates of stools from dysenteric convalescents contained a lytic agent for Shiga's bacillus, and he showed that this lytic principle could be propagated in series. From this and other observations (effect of temperature and antiseptics on the lytic agent) D'HERELLE concluded that the phenomenon of bacteriolysis with which he was dealing was brought about by a living ultramicroscopic virus—a bacterial parasite—to which he gave the name *bacteriophage*. It has since been shown that this lytic principle or "bacteriophage" is present in many forms of organic matter (intestinal contents of man and animals, pus, peritoneal exudates, tissue juices, etc.) and that its action is not specific, a given lytic principle exerting its action on a more or less wide range of bacterial species, the members of the coli-typhoid-dysentery group being the most generally susceptible.

Although the facts, as originally observed by D'HERELLE, have been amply confirmed by other investigators, his explanation of the phenomenon has not met with general acceptance. BORDET and CUICA are of the opinion that the lytic principle originates from the bacteria themselves produced in response to some external stimulus (leucocytic exudate), and that the bacterial destruction liberates a further supply of lytic principle. KABESHIMA thinks that the lytic agent is an unorganized ferment whose origin he does not specify. LISBONNE and CARRIÈRE are of the opinion that the lytic enzyme is produced by intestinal bacteria as a result of bacterial antagonism. The majority of workers, however (GRATIA, BRUYNOGHE, WEINBERG and ANZAR, MCLEOD, LEDINGHAM, FLEMING, ELLIS, KUTTNER), incline to the view that this phenomenon is one of bacterial autolysis, which can be initiated by a variety of primary stimuli, the bacterial destruction liberating a further supply of enzyme capable of carrying on the process.

Until comparatively recently, this appeared to be the only alternative to the bacteriophage theory of D'HERELLE. Bail, however,

has supplied us with a still further hypothesis. This author thinks that the filter-passing lytic principle consists of minute corpuscles which are the product of the bacterial destruction. According to Bail these corpuscles—which he names " Splitter "—represent portions of the original bacterial cell, capable themselves of secreting enzymes. In his most recent papers on this subject he supports and elaborates his original conception. He supposes that these corpuscles or " Splitter " represent portions of the hereditary (chromatin) apparatus of the bacterial cell and that the enzyme secreted by them performs some essential function in bacterial multiplication. All this is highly speculative and will require very substantial proof before it can be accepted.

S. Phillips Bedson.

HAUDUROY (P.). **De l'action du sérum antidysentérique sur la lyse du bacille de Shiga par le bactériophage de d'Herelle.**—*C. R. Soc. Biol.* 1922. Oct. 28. Vol. 87. No. 31. pp. 966–967.

If in each of a series of, say, 20 tubes each containing an equal amount of a young culture of Shiga bacillus a drop of antidysenteric bacteriophage be placed (an amount sufficient to effect lysis), and then there be added Pasteur Institute antidysenteric serum in a gradually increasing dose throughout the series, beginning with two drops in the first tube and ending with 40 drops in the twentieth tube, lysis will take place at intervals varying from half-an-hour to eight hours in all the tubes, except the last three, which have received respectively 36, 38 and 40 drops of the serum. This holds good whether the serum be fresh or old and whether it came from the same horse or not, and for any strain of Shiga bacillus, and for any strain of antidysenteric bacteriophage. In other words, antidysenteric serum inhibits the action of d'Herelle's bacteriophage.

Since the filtrate taken from any tube before lysis has occurred contains the bacteriophage intact, we must infer that the inhibitory action of the serum is exercised not on the bacteriophage but on the Shiga bacillus. We may suppose that something is secreted by the bacillus that intervenes in the d'Herelle phenomenon ; that this " something " is fixed by the antidysenteric serum, so that lysis is stopped or retarded, and that as the bacilli multiply more of this " something " is produced, and lysis starts again. If, however, an excess of the serum has been added—as in the tubes that received 36, 38 and 40 drops—lysis is inhibited for an indefinite time.

P. H. M-B.

ONGKIEHONG (H. F.). **Pathogene darmbacterïen en lage temperaturen.**—*Tijdschr. v. Vergelijkende Geneesk. enz.* 1922. Aug. 5. Vol. 7. No. 4. pp. 244–253. [English and French summaries pp. 253–254.]

From a study of the influence of low temperatures on dysentery bacilli of various types, the author found the atoxic types more resistant to low temperatures than the more toxic ones. At —20° C. in the freezing tank, about —190° C. in liquid air, and —253° C. in liquid hydrogen, some toxic strains died, while some atoxic strains survived —190° C. and —253° C. for several days.

The colon bacillus and the typhoid-paratyphoid group are more resistant to low temperatures; they were not killed after exposure to −20° C. for 30 days, at −190° C. in liquid air, and at −253° C. for three days in liquid hydrogen.

P. H. M-B.

Charbonnel (M.). **Abcès osseux colibacillaire postdysentérique.**—*Rev. de Chirurg.* 1922. Year 41. No. 5. pp. 345–358. With 2 figs. in text.

A purely technical and surgical discussion on the best method of treatment for bone abscesses occurring after dysentery. In this case two abscesses were situated in the shaft of the tibia.

P. H. M-B.

Mixed and Unclassed Dysentery.

Anderson (J. S.). **Dysentery in the West Indies.**—*Proc. Roy. Soc. Med.* (Sect. of Trop. Dis. & Parasit.). 1922. Sept. Vol. 15. No. 11. pp. 53–56.

Figures culled from the published vital statistics show that dysentery accounts for about 5 per cent. and intestinal diseases 20 per cent. of the total deaths in the West Indies. The facilities for laboratory diagnosis in this part of the Empire are extremely limited, and, with the possible exception of the capital towns, there is no centre for microscopic examinations. The three main types of dysentery are found there—the bacillary, the protozoal and the helminthic (*Schistosoma mansoni*), though the question of diagnosis is practically limited to the two first named.

Complications of amoebiasis, commonly seen in the East, are singularly rare in the West Indies; in nine months Anderson saw only one case of perforating amoebic ulcer and two cases of liver abscess.

British Guiana has almost unique difficulties in sanitation. The inhabited portion of the colony lies on an average 4 ft. below the high-water level. In Georgetown small septic tanks have been installed in most of the public buildings, but the greater part of the city is most insanitary; dysentery therefore is afforded every chance to spread.

The treatment of dysentery in the West Indies leaves much to be desired. Most of the native drugs employed are astringents, but there is one prepared from the fruit of *Aldinia insignis* which was found to consist almost entirely of pure starch. As a general rule, acute cases are treated with hypodermic injections of emetine and saline aperients; if no improvement results after two such injections, bacillary dysentery is diagnosed, though antidysenteric serum is not utilized or appreciated at all.

P. H. M-B.

Jausion (H.). **Les dysenteries à Fez de mai à décembre 1921.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1922. Sept. Vol. 2. No. 3. pp. 377–386. With 1 chart in text.

It is necessary to distinguish autochthonous cases of dysentery from those imported by troops or civilians visiting the Colony. In the first category are placed amoebic and bacillary dysentery, enteritis caused

by Lamblia, Trichomonas, spirochaetes, and by various helminths. Important helminths are the ankylostome, schistosome and *Hymenolepis nana.*

Amoebic dysentery was diagnosed 231 times by the active and 39 times by the cystic forms. Both were present in the stools of a single case. The number of cases began to increase towards the end of summer and reached its maximum in December. Two proved fatal, one from numerous perforations. In 184 cases, bacillary dysentery was recognized by the characteristic exudate in the stools. Conditions militate against the successful isolation of the specific bacilli for the reason that in military practice cases are not admitted to hospital till the fourth or fifth day of their illness.

From the blood of two extremely serious cases *Bacillus paratyphosus* B was isolated. *Giardia intestinalis* was found on 65 occasions; save in one or two exceptions, this parasite appeared in association with other forms of dysentery. Spirochaetes and fusiform bacilli were present in 20 examinations. Ascaris ova were found 44 times and those of trichocephalus 31 times. Ankylostomiasis, classified here as a dysentery, appears to have been imported recently into Morocco by labourers from the Cameroons. *Taenia saginata,* Oxyuris, Hymenolepis, Blastocystis, and even a mite—*Tiroglyphus siro*—are held responsible for causing dysenteries.

P. H. M-B.

Dumont (J.). **Dysenteries amoebo-spirillaires et dysenteries spirillaires.** —*Paris Méd.* 1922. Aug. 12. Vol. 12. No. 32. pp. 161–164.

The spirochaetes found in association with or as a result of long-standing amoebic infection are certainly not *Sp. vincenti,* but are spiral organisms. Films must be stained by the Fontana-Tribondeau method in order to demonstrate them adequately. In preparations thus made the organisms are 7–8 μ in length; longitudinal division has never been observed. The organism, the author thinks, is similar to that previously described by Le Dantec. It is peculiar to the intestinal mucus and is not found in the saliva or vaginal mucus. Emetine has no effect on these cases, but, according to the author, even two intravenous injections of 0·3 gm. of neosalvarsan are followed by almost instantaneous improvement. The organism is found in very small numbers in the mucus of the normal colon, but it appears to multiply excessively only in certain cases of amoebic dysentery and probably is the cause of the obstinacy of these cases.

P. H. M-B.

Chelmonski (A.). **Le traitement de la dysenterie.**—*Gaz. des. Hôpit.* 1922. Sept. 12 & 14. Vol. 95. No. 71. pp. 1143.

——. **Die Behandlung der Ruhr.**—*Ztschr. f. physikalische u. diätetische Therap.* 1922. Vol. 26. No. 9. pp. 346–347.

Without any attempt at differentiation on an etiological basis, this physician believes that he can cure any case of dysentery, however desperate, by what he terms the antiphlogistic method. Exactly what he means by this is not clear; apparently it consists of clearing out the bowel and placing the patient on a starvation diet, consisting mostly of albuminous substances. An initial dose of calomel or castor-oil should be

given and sweetened tea should be the only source of nourishment; the remainder of the treatment is mainly dietetic (black coffee, cocoa, cheese, grilled meat and, during convalescence, finely chopped hard-boiled eggs).

He also appears to subject his patients to a cold "sitzbad" daily for 20 to 30 minutes and maybe, under certain circumstances, to ice-poultices to the abdomen.

P. H. M-B.

MELNOTTE. **Un cas de dysenterie balantidienne.**— *Arch. Instituts Pasteur de l'Afrique du Nord.* 1922. Sept. Vol. 2. No. 3. pp. 374–376.

The rarity of this form of dysentery in North Africa prompted the publication of this paper. The patient, who was not acutely ill, was passing diarrhoeic stools with blood and mucus flecks, alkaline in reaction and numbering 6–8 per diem. Besides the balantidia, ova of ascaris and trichocephalus were numerous; the organisms themselves were typical and contained ingested red blood corpuscles. The patient was cured with thymol and salicylic acid, 1 per cent. lavage, followed by santonin and calomel as a vermifuge.

The author concludes that the symptoms were attributable to the balantidia and not to the coexistent helminthic infection, and that the salicylic acid played a favourable part in the treatment.

P. H. M-B

CHRISTELLER (Erwin). **Ueber die Balantidienruhr bei den Schimpansen des Berliner Zoologischen Gartens.**— *Virchows Arch. f. path. Anat. u. Physiologie.* 1922. Aug. Vol. 238. No. 3. pp. 396–422. With 24 text figs.

A female chimpanzee in the Berlin Zoo, notorious as having given birth to a well-formed baby in captivity, commenced dysenteric symptoms in August, 1921; in the faeces, numbers of active balantidia were seen, but the dysentery bacilli were not detected. At autopsy the intestinal mucosa was injected, swollen and beflecked with small ecchymoses, occurring especially on the mucous folds; but the balantidia could not be demonstrated either in the gut wall or in its contents, for which the partial decomposition of the tissues is held responsible. Shortly afterwards a second animal died after a brief acute illness and again balantidia were found in the stools. The pathologo-anatomical picture was similar, that is a haemorrhagic inflammation with minute follicular swellings. In this case a preliminary formalin injection of the cadaver had been made and therefore the tissues were perfectly preserved.

In sections, numerous balantidia were present in the acini of Lieberkühn's glands and around them very considerable leucocytic infiltrations had taken place, with a considerable proportion of eosinophiles. The organisms do not usually penetrate the muscularis, and only once were nests of individuals encountered in the submucosa. They appear to congregate especially in the solitary lymphoid follicles and to ingest polymorphonuclear corpuscles and red blood cells. They are undoubtedly responsible for the pathological condition and may

even phagocytose large numbers of bacteria. The organisms were found nowhere else in the body, though the mesenteric glands were large and infiltrated.

[This paper is illustrated with some excellent microphotographs.]

P. H. M-B.

Ascoli (Alberto). **Contributo alla conoscenza della dissenteria da Shiga-Kruse.**—*Boll. d. Istituto Sieroterapico Milanese.* 1917. Mar. Vol. 1. No. 1. pp. 21–46. [Received Oct. 16, 1922.]

Colombo (F.). **Vaccinazione contro la Dissenteria bacillare.**—*Boll. d. Istituto Sieroterapico Milanese.* 1920. Dec. No. 6. pp. 397–399. [Received Oct. 16, 1922.]

Córdoba (Salvador). **Comentarios acerca del tratamiento quirurgico de las disenterias agudas graves.**—*Gac. Méd. de Caracas.* 1921. Nov. 15. Vol. 28. No. 21. pp. 324–328.

Gaehlinger (H.). **Les entérites chroniques parasitaires et leur traitement.**—*Bruxelles-Méd.* 1922. July. 2e année. No. 17. pp. 427–432.

RELAPSING FEVER AND OTHER SPIROCHAETOSES.

MESNIL (F.). **Sur la nature des spirochètes.**—Reprinted from *La Médecine.* 1921. Sept. 4 pp.

The writer of this paper gives an interesting summary of recent work on the group of organisms known as spirochaetes. EHRENBERG created the two genera *Spirochaeta* and *Spirillum*, the former including flexible and the latter rigid organisms. He regarded them as animals belonging to the family of the Vibrios. Forty years later the discovery of the spirochaete of relapsing fever was made, and after another 20 years a similar form in the blood of geese was described. VINCENT discovered spirochaetes in the disease now known as Vincent's angina, and SCHAUDINN and HOFFMANN found them in syphilis. Later still, spirochaetes in infectious jaundice, rat-bite fever, yellow fever and "Mediterranean dengue" were described.

Though EHRENBERG regarded both the spirochaetes and spirilla as animal organisms, later observers grouped them with the bacteria, till SCHAUDINN claimed to have proved that the spirochaetes were stages in the evolution of certain protozoa. Even before this the large spiral organism which occurs in oysters and possesses a membrane was considered by CERTES to be related to the trypanosomes. Working in conjunction with LAVERAN, the author showed that such a view was incorrect and that the parasites of the oyster were in no way related to these flagellates. At the present time all observers are agreed that the spirochaetes have nothing in common with the flagellate protozoa. There is no organized nucleus and the body consists of a series of chambers, in the walls of which chromatin occurs. In the smallest forms little or no structure can be made out. Multiplication is by transverse and not longitudinal division. The only character which separates the spirochaetes from the bacteria is the flexibility of the body. To the author it seems in many cases impossible to classify lowly organisms as definitely animal or vegetable, and he reflects that as nature has not made these hard and fast demarcations it may be futile for us to attempt to do so.

As regards the spirochaetes themselves there seems to be little doubt that the large crested organism of the oyster occupies a place apart and can be legitimately placed in a separate genus, *Cristispira*. For the other forms EHRENBERG's *Spirochaeta plicatilis* is the type, and from the researches of ZUELZER it is known to consist of an axial filament round which is wound the spiral cytoplasmic body. The question is raised as to whether the other spirochaetes are similarly constituted. SCHAUDINN created the genus *Treponema* for the spirochaete of syphilis chiefly because of the presence of a terminal filament, while SWELLENGREBEL and SAMBON almost simultaneously suggested the names *Borrelia* and *Spiroschaudinnia* for those of relapsing fever. NOGUCHI created the genus *Leptospira* for the organism of infectious jaundice. It was noted that the axial filament characteristic of the genus *Spirochaeta* was not apparent in these forms, and the genera were separated on the varying rigidity of the spirals and the degree of their development. Japanese workers, however, have shown that such an organism, which occurs in the blood of fowls, studied in the blood itself and in cultures varies considerably in these respects, so that it is impossible to consider them as essentially different from the

spirochaete of syphilis. The author remarks that he has searched in vain for any character which affords a reliable means for separating these genera. Zuelzer's recent work appears to show that there is no object in retaining them. According to her the spirochaete of infectious jaundice actually has an axial filament, and she thinks it is probable that other pathogenic forms have also. We are thus brought back to the single genus *Spirochaeta* for all these forms, a result which will lead to a very desirable simplification of the nomenclature. Without any generic significance the words treponema and leptospira may, however, still be employed for the sake of convenience.

The organism of rat-bite fever, which is perfectly rigid and has one or more flagella at each end, cannot be regarded as a spirochaete. It is a pathogenic spirillum. There appear, however, to be forms which occupy a position intermediate between the spirochaetes and spirilla. Duboscq and Lebailly have shown that certain spiral organisms which were discovered in the stomach cells of cats and dogs by Bizzozero have terminal flagella but flexible bodies. For these forms they establish the genus *Spirella*, which occupies an intermediate position between the genera *Spirillum* and *Spirochaeta*.

Zuelzer has demonstrated that in water there occur a series of spiral organisms which correspond morphologically with all those which have been shown to be pathogenic for man and animals—observations which open up a rich field for investigation.

C. M. Wenyon.

Hoffmann (W. H.). **La inmunidad en las enfermedades espiroquéticas.** [Immunity in Spirochaetal Diseases.]—Reprinted from *San. y Benefic. Bol. Ofic.* 1922. Jan. & Feb. Vol. 27. Nos. 1 & 2. pp. 3–24.

——. **Die Immunitätserscheinungen bei den tropischen Spirochaetenkrankheiten.**—Reprinted from *4th Congress of the Far Eastern Assoc. of Trop. Med.* 1921. Batavia. 42 pp.

Under the head of *Recurrent Fever* the most important points noted are, first, the rôle played by the spleen. Animals which, under ordinary conditions, recover, die if splenectomy has been first performed, and, further, animals normally insusceptible, such as grey rats, to *Sp. duttoni*, become susceptible after this operation. Secondly, the immunity resulting from an untreated attack of the disease is much stronger than that produced after cure by injection of salvarsan; in fact, in the latter there may be no immunity produced at all. Treatment by injection of the serum of a patient who has passed through an attack 2–10 weeks previously has as good results as those with salvarsan and does not interfere with the production of active immunity.

Prophylactic injection of defibrinated blood (1 to 20 cc.) from recovered patients gives definite protection for a brief period only—not more than a week.

Fowl Spirochaetosis.—The blood of an animal which has passed through an attack protects others for a period of 3–4 weeks. In the case of this organism extirpation of the spleen does not have the deleterious effects mentioned under recurrent fever. Hereditary transmission of immunity occurs in this form only of the spirochaetoses.

In *Syphilis* antibodies are never produced in sufficient amount to bring about spontaneous cure. Under the most favourable circumstances there is established merely an equilibrium between the spirochaetes and the defensive forces, which may break down at any

moment. Also, cure of the disease does not result in the production of immunity, since such a person is then as susceptible to a fresh attack as a healthy man.

Mention is made of the treatment of syphilis of the nervous system by intrathecal injection of salvarsanized serum, the beneficial effects being due, the author thinks, in part at least to antibodies formed in the serum, while failure of natural cure or even amelioration of such conditions is due to anatomical causes, the antibodies in the blood being unable to reach the cerebrospinal fluid in sufficient quantities.

In the case of *Weil's Disease* an attack confers immunity which, so far as is known, may persist for years. The serum, either that of a convalescent or that obtained from horses artificially immunized, being spirochaeticidal and lytic, and not antitoxic, must be given before the fifth day and before there is any jaundice if it is to be of any service. Mention is made of the employment of serum for prophylaxis and also of vaccines. The latter protect for three months or more and should be polyvalent, as the strains of leptospira differ in different places.

The permanent immunity resulting from an attack of *Yellow Fever* and the use of antiserums and vaccines are spoken of. In experimental work with guinea-pigs a definite leucocytic reaction is noticed and in severe cases is a favourable sign. In man, however, it does not occur in this disease, though it has been noticed in infectious jaundice.

" Rabbit syphilis," disseminated sclerosis, ulcus tropicum, ulcerative stomatitis, bronchial spirochaetosis, spirochaetal dysentery, rat-bite fever, and seven-day fever, all receive brief mention, but, from the point of view of immunity, no new facts are educed.

H. Harold Scott.

St. John (J. Harold) & Bates (Lewis B.). **The Relapsing Fever Spirochete of Panama. Evidence to show that it is a Distinct Species.**— *Amer. Jl. Trop. Med.* 1922. May. Vol. 2. No. 3. pp. 251–266.

The authors have conducted a series of experiments with the relapsing fever spirochaete of Panama and have compared its serological reactions with those of other relapsing fever spirochaetes. The serum of monkeys and rats which had recovered from infections and had been rendered hyperimmune by further injections of the organisms was tested on the various strains as regards its agglutinating and spirochaetocidal action *in vitro* and its power of conferring immunity *in vivo*.

Several strains of the Panama virus were used, and it was found that the sera of animals which had been rendered immune to these strains agglutinated and killed the various strains and protected against infection, a result which tended to show that the several strains were the same. The serum of the Panama strains, on the other hand, did not affect other strains such as *S. obermeieri*, *S. novyi*, *S. kochi* and *S. duttoni*. Moreover, these strains resembled one another more closely than they did the Panama strain, from which they differed in a striking manner. It results from these investigations, which are illustrated by a number of tables which form the bulk of the paper, that the Panama relapsing fever spirochaete differs from the others against which it was tested, and that there is some justification for regarding the spirochaete as a distinct " species, variety or strain."

C. M. W.

Bates (Lewis B.) & St. John (J. Harold). **Suggestion of *Spirochaeta neotropicalis* as Name for Spirochaete of Relapsing Fever found in Panama.** [Correspondence.]—*Jl. Amer. Med. Assoc.* 1922. Aug. 12. Vol. 79. No. 7. pp. 575–576.

As the neotropical region includes Central and South America, the name *Spirochaeta neotropicalis* is proposed for the relapsing fever spirochaete of Panama, which may be identical with that producing relapsing fever in Colombia and Venezuela.

C. M. W.

Darling (Samuel T.). **The Rat as a Disseminator of the Relapsing Fever of Panama.**—*Jl. Amer. Med. Assoc.* 1922. Sept. 2. Vol. 79. No. 10. pp. 810–812.

The work of Bates, Dunn and St. John [this *Bulletin*, Vol. 19, p. 320] on the transmission of relapsing fever of Panama by the tick, *Ornithodorus talaje*, raises the question of the possibility of rats playing a part in the spread of the disease. The writer has noted that the house rat, *Mus rattus*, is frequently found infested with the nymphs of this tick, and as rats are susceptible to inoculation it is not improbable that the spirochaetes may be transmitted from the rat to man by the ticks. Rats undoubtedly play a part in the dispersal of the ticks and presumably also of the infective agent of relapsing fever in Panama.

C. M. W.

Briggs (LeRoy H.). **Relapsing Fever in California.**—*Jl. Amer. Med. Assoc.* 1922. Sept. 16. Vol. 79. No. 12. pp. 941–944. With 4 text figs.

Though cases of relapsing fever of extraneous origin had previously been noted in the United States, the first outbreak which could be ascribed to an endemic focus was that recorded by Meader (1915) from Bear Creek Canyon, Colorado, in which five related cases occurred. Two years later Waring recorded an isolated case also from Colorado. In the present paper the author reports the occurrence of relapsing fever in a man and his wife who contracted the disease while camping in California. How the infection was acquired is not known, but as species of Ornithodorus occur in the locality it is probable that these ticks are the vectors.

C. M. W.

Kerrest (J.), Gambier (A.) & Bouron (A.). **La fièvre récurrente au Soudan.**—*Bull. Soc. Path. Exot.* 1922. May 10. Vol. 15. No. 5. pp. 320–331. With 1 map in text.

Up to the beginning of 1921 relapsing fever was unknown in the French Sudan, but the disease appears to have been introduced by native soldiers returning from active service abroad, who were assembled at Kati on the Niger before distribution to their homes. The authors trace the spread of the disease to the towns and villages on the river. The vector appeared to be the louse.

The disease was of a severe type, and in a large number of cases was associated with enlargement and tenderness of the liver, and jaundice. There was violent headache, and diarrhoea was common.

Vomiting, except in Europeans, was a rare symptom. Albuminuria constantly occurred, but was only marked and persistent in a few cases. Haemorrhage in the form of epistaxis was a common feature, and its severity bore a definite relation to the intensity of the jaundice. As regards the mortality, in one series of 48 cases there were eight deaths, and in another of 120, which were only diagnosed clinically, there were 14 deaths. It is remarked that the disease is a serious one, and that a differential diagnosis from Weil's disease may be difficult to make unless the spirochaete is found in the blood.

C. M. W.

SERGENT (Edm.) & FOLEY (H.). **L'épidémiologie de la fièvre récurrente dans l'Afrique du Nord.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1922. June 22. Vol. 16. No. 3. pp. 170–187. With 5 figs. & 1 chart.

Having read the paper by CRAGG on relapsing fever in the United Provinces of India, [this *Bulletin*, Vol. 19, p. 555] the authors describe the conditions which prevail in a district in North Africa and show that the factors which govern outbreaks of the disease are not the same as in the district investigated by CRAGG.

The climate at Beni-Ounif de Figuig, a military post on the Morocco-Algerian border of the Sahara, is extremely hot and dry in summer and cool but still relatively dry in winter. Outbreaks of relapsing fever were studied here in 1907 and 1914, and they attained their greatest intensity in the months March to June. The hottest season is in July. After this the disease disappears almost completely in the period August to October, to commence again with the rains and cool weather in November.

Relapsing fever amongst this isolated population is thus a cool weather disease. Age, sex and nationality have no influence on its incidence. When it comes to the question of the explanation of the epidemics which occur from time to time the authors cannot agree with CRAGG that this is to be found in exceptional climatic conditions which influence the development of the louse. They believe that during an epidemic the bulk of the population acquire an immunity which is not of permanent duration, and that as this immunity is gradually lost with time the population again becomes liable to reinfection. This occurs directly cases of the disease are introduced, probably by the nomad Arabs transporting infected lice.

As regards typhus fever, which occurs in epidemic form from time to time like relapsing fever, it appears in November and reaches its intensity during the period March to May. Both diseases, however, occur sporadically throughout the year. Typhus fever outbreaks follow periods of depression and poverty of the population.

An account is given of the experimental work which has been conducted in Algeria since 1907 in connexion with the louse transmission of relapsing fever. This is fairly well known and serves to establish the fact that lice are the actual vectors, and that the spirochaetes ingested by the lice, after an unexplained temporary disappearance, reappear in the tissues of the lice in large numbers from the sixth day onwards.

C. M. W.

CRAGG (F. W.). **Relapsing Fever in the United Provinces of Agra and Oudh.**—*Indian Jl. Med. Res.* 1922. July. Vol. 10. No. 1. pp. 78–189. With 17 charts, 5 maps & 1 text fig.

This paper is an amplification of one reviewed in this *Bulletin* (Vol. 19, p. 555). It is mainly of epidemiological interest and the arguments in favour of the existence of relapsing fever in the United Provinces and its seasonal incidence are supported by a number of charts and curves constructed from figures in the official reports. The epidemics which have occurred from time to time reach their height in the three hottest and driest months of the year, a season which is generally supposed to be least favourable to the louse. Relapsing fever does not occur, as in other countries, during the cold season, whereas typhus fever in India is true to type and is only found in the colder districts.

During epidemics the death-rate for the ages 20 to 40 increased to a figure which varies from two to nearly three times the mean death-rate for the previous five years, while it becomes evident that relapsing fever in the United Provinces kills more males than females. The disease, moreover, is not one which is confined to the poorest and most ill-housed of the population, but one to which practically all the inhabitants are liable, irrespective of their caste or habitat. There is little doubt that infestation with lice is the normal condition among the bulk of the population, and is by no means confined to the lower castes or very poor. The disease remains in endemic form and, owing to climatic circumstances, which were explained in the previous review (*loc. cit.*), every now and then breaks out in epidemic form.

A certain number of experiments with lice were made with a view to establishing their method of transmitting the disease and confirming the work of French observers. Though these were far from complete they appeared to indicate that the development undergone by the spirochaete in the louse in India was similar to that described in North Africa.

It results from the facts brought forward in this paper that it should be possible to foretell an epidemic. The peculiar climatic conditions in the shape of exceptionally low temperatures in April and May, which only prevail in the year preceding an epidemic, and any increase in the autumn-death rate of males not attributable to cholera or other major diseases are probably indications that an outbreak of relapsing fever in epidemic form will follow.

C. M. W.

STAROBYNSKY (A.). **La fièvre récurrente persane (Miana).**—*Presse Méd.* 1922. Aug. 30. Vol. 30. No. 69. pp. 1445–1446.

The writer states that so long ago as 1844 a Russian traveller in Persia recorded the existence of a disease in Miana which was caused by "white bugs." There was intense fever, often terminating fatally. A complete description of the disease was given by DJOUNKOWSKY in 1912 [see this *Bulletin*, Vol. 1, p. 624]. It was common amongst the Russian troops who advanced into Persia in this year. Similarly in the last war the troops were again infected. The writer observed a number of cases. The first attack of fever, which occurred about five days after exposure to ticks, frequently lasted only one day. The number of relapses varied from three to nine. Generally speaking, the illness was less severe than the European type of relapsing fever,

though its duration was usually longer and sometimes extended through two or three months.

The tick which is regarded as responsible for the disease is *Ornithodorus tholozani* or, as some would have it, *Ornithodorus miana*.

In the author's opinion the Miana disease closely resembles the tick fever of Africa, and since near Batoum, on the Black Sea, there is a negro colony, he thinks it possible that the African disease was imported and has found a footing owing to the presence of *Ornithodorus tholozani*.

C. M. W.

KLIGLER (I. J.). **The Cultivation of** *Spironema duttoni* **from a Case of Relapsing Fever.**—*Brit. Jl. Experim. Path.* 1922. Aug. Vol. 3. No. 4. pp. 215–216.

In Vol. 19, p. 323, of this *Bulletin*, an account was given of a medium in which Kligler and ROBERTSON successfully cultivated the spirochaete of relapsing fever. In this case the cultures were obtained from experimental animals. The author of the present paper states that he has obtained a culture on this medium from a human case, and has been able to maintain it by subculture and to infect rats by means of the cultural forms. He is led to record this observation as the only record he can find of the successful culture from the human blood is by PLOTZ [this *Bulletin*, Vol. 10, p. 270].

C. M. W.

BJEKOLOFF (P.) & SCHUHALTER (W.). **Beitrag zur Züchtung der Rückfallfieber-spirochäte und einige Bemerkungen ueber die Immunität bei Rückfallfieber.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1922. Vol. 26. No. 9. pp. 265–269.

The authors have succeeded in cultivating the relapsing fever spirochaete in a medium which is a slightly modified form of that recommended by ARISTOWSKY. It is prepared as follows :—

The white of a hard-boiled egg is cut into pieces from 1–2 cm. in length, several of which are placed in each test tube. After adding to each tube 8 cc. of physiological saline solution the tubes are autoclaved at 115–120°C. for 15 minutes. When cool, to each is added either 4 cc. of fresh uninactivated horse serum, or better, 2·5 cc. of inactivated rabbit serum. The medium is inoculated with 1–5 drops of the patient's blood. Incubated at 28°–30° there is a maximum growth at the end of 4–6 days. Subculture is effected by transferring with a pipette about a drop of the culture to a fresh tube.

Though ARISTOWSKY was successful in maintaining a culture for two months, during which 19 subcultures were made, the authors have only succeeded in carrying the culture through 4 subcultures. As regards the possibility of obtaining cultures, the strains of spirochaetes from different patients vary considerably.

C. M. W.

MARZINOWSKY (E. I.). **Ueber die Entwicklung der** *Spirochaeta recurrentis* **im Organismus des Menschen.** [The Development of *S. recurrentis* in Man.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1922. Vol. 26. No. 8. pp. 231–237. With 1 fig.

From a study of the behaviour of spirochaetes in the blood of relapsing fever cases the author believes he has found an explanation

of the relapses. During the course of the first attack with the development of antibodies in the blood, some of the spirochaetes are destroyed while others become rolled up into forms which are said to be analogous to cysts. It is stated that salvarsan has a much feebler action at the end than at the beginning of an attack owing to the presence of these resistant forms. The destruction of the spirochaetes in the body is largely due to phagocytosis. Within the phagocytes the spirochaetes are quickly destroyed, whereas the encysted forms are able to resist the digestive powers of the cells. During the apyrexic period the development of the encysted forms takes place till finally spirochaetes are again formed and these, escaping from the leucocytes, lead to the relapse. [It is evidently incorrect to apply the term cyst to these forms, and the evidence that they are actually able to give rise to spirochaetes again and that the series traced is not one of progressive degeneration instead of reconstruction appears unconvincing.]

C. M. W.

ZELLER (Heinrich). **Neosalvarsandosis und Milchzuckerinjektionen bei Rückfallfieber.**—*Muench. Med. Woch.* 1922. July 28. Vol. 69. No. 30. p. 1121.

The author has investigated the action of intravenous injections of solutions of lactose in relapsing fever. If 5–10 cc. of a boiled 10 per cent. solution are given, a severe rigor occurs in 1–2 hours. This is followed in about 12 hours by a crisis associated with profuse sweating. In most cases, however, the temperature rises again in a short time. It is found that the injection causes an agglutination of the spirochaetes in the blood. In some cases, however, there is no subsequent rise of temperature till ten days later, when a relapse would be expected. If a small dose of neosalvarsan (0·1–0·2 gm.) is administered after the 10 cc. of the sugar solution the same phenomena are noted, a rigor followed by a fall in the temperature, which again rises to its original height. After a further interval of 20–40 hours the temperature again falls and this time remains down, there being no recurrence. Combined with solutions of lactose, small doses of neosalvarsan thus bring about a cure which only larger doses of neosalvarsan alone are able to effect.

C. M. W.

PODIAPOLSKY (P.). [In Russian. Abridged Version in German.] **Zwei Worte ueber den Rückfalltyphus und den Flecktyphus. Ein historisches Notabene zum Moment.** [A Historical Note on Relapsing Fever and Typhus.]—*Rev. Microbiol. et Epidemiol.* Saratov. 1922. Vol. 1. No. 2. pp. 181–183.

This note has been written to call attention to the long forgotten work of Professor Gregor MÜNCH (in Russian, MINCH) on relapsing fever. Immediately after the appearance of OBERMEYER's account of the occurrence of spirilla in this disease in 1873, experiments were undertaken by MÜNCH, who not only saw the organisms in cases of relapsing fever in Odessa, but actually infected himself by inoculation of blood and definitely recognized that the disease could be distinguished from typhus by the presence of the parasites in the blood. MÜNCH gave an account of his experiments in the *Moskowsky Wratschebny Westnik* (Moscow Medical News), 1874, No. 1, Sept. 9.

C. M. W.

FAUST (Ernest Carroll). **Bronchospirochetosis in China.**—*Arch. Intern. Med.* 1922. Sept. 15. Vol. 30. No. 3. pp. 343–354. With 1 fig. & 3 charts.

The author of this paper has undertaken the study of bronchial spirochaetosis in China, a country in which little attention appears to have been paid to this condition. A systematic investigation of cases suffering from haemoptysis in the Wuchang hospital has revealed the fact that the percentage of cases with spirochaetal infection of the bronchi is decidedly high. It is admitted that a large proportion prove to be primary cases of tuberculosis, pneumonia, gangrene, empyema, moniliasis, paragonimiasis or rhinitis, but in a certain number it is stated that the spirochaete is the primary agent.

The primary cases may be acute, sub-acute or chronic. In the acute the disease is initiated by chill and fever and lasts from two to eight days. The expectoration is scanty and mucopurulent and seldom contains traces of blood. While arsenicals produce relief, the clinical symptoms may disappear without treatment. In the sub-acute type the general symptoms are similar but there may be haemoptysis and bronchitis with slight crepitations. The chronic cases are insidious in onset and there is chronic cough. The sputum is mucopurulent, often blood-streaked, while in many instances there is considerable haemoptysis. There may be moist or dry râles or consolidated areas. In many cases there is a daily rise of temperature. In most cases rest and treatment with Fowler's solution, cacodylates, arsphenamine or neoarsphenamine bring about rapid recovery and apparent cure. In acute cases arsenicals injected intravenously give immediate relief, but cure is not effected till after a second and perhaps third dose. In the chronic cases, arsenicals are definitely specific and relatively rapid in their spirochaeticidal properties. This fact appears to meet Dr. MANSON-BAHR's objection, cited from his book, that the causal relationship of the spirochaete to the condition has not been proved.

C. M. W.

MOUCHET (R.) & VAN NITSEN (R.). **La bronchite spirillaire dans les camps de travailleurs noirs au Katanga.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1922. Vol. 2. No. 1. pp. 115-120. With 3 charts.

Cases of bronchitis associated with blood-stained expectorations are more common in Katanga than has hitherto been supposed. Spirochaetes are present in the sputum but associated with them are usually found numerous bacteria including pneumococci, staphylococci, streptococci and several other varieties. Amongst the natives the condition often leads to bronchopneumonia and pneumonia. As treatment the authors have employed tartar emetic, stibenyl, ioglysol (a colloidal preparation of iodine and glycogene) and neosalvarsan. Though the first three drugs appear to influence the condition favourably, none of them has any action whatever on the spirochaetes, which persist as long as expectoration continues.

C. M. W.

DE MELLO (Froilano) & DE ANDRADE (Mario). **Spirochétose broncho-pulmonaire au Nord de Portugal.**—*Bull. Soc. Path. Exot.* 1922. May 10. Vol. 15. No. 5. pp. 284–286.

The paper records the occurrence of bronchial spirochaetosis in North Portugal. The morphology of the spirochaetes is described

and compared with that of the forms which occur in the mouth. The suggestion is made that these various spirochaetes may be distinguished by an index which is obtained by dividing the sum of the lengths of a hundred organisms by the total number of turns they possess. In this way a figure is found for the average length of each spiral. In *S. buccalis* the index was 2 and in *S. dentium* 1·5, while in *S. bronchialis* it varied from 1·63 in one case to 1·18 in another.

It is stated that the bronchial spirochaete is extremely polymorphic, and the fact that the index of the spirochaetes varied in the two cases between 1·63 and 1·18 rather suggests that the index is of little diagnostic value.

C. M. W.

Blanchard (M.) & Lefrou (G.). **Présence de spirochètes dans le sang d'européens atteints de fièvre bilieuse hémoglobinurique. Le problème étiologique de cette spirochétose.**—*Bull. Soc. Path. Exot.* 1922. Oct. 11. Vol. 15. No. 8. pp. 699–722.

—— & ——. **Sur un spirochète trouvé dans le sang de cas de fièvre bilieuse hémoglobinurique, et son section pathogène.**—*C.R. Acad. Sci.* 1922. Oct. 9. Vol. 179. No. 15. pp. 602–604.

By a process of repeated centrifugation of the blood of two cases of blackwater fever the authors have isolated a spirochaete which is inoculable to guinea-pigs. Structurally the organism appears to resemble a leptospira though the description of the morphology is not very clear.

There seems to be no doubt that the two cases, which were both in Europeans, were such that a diagnosis of blackwater fever was justified. One terminated fatally; the other recovered. The method by which the spirochaetes were obtained was as follows:—

From the vein 10 cc. of blood was extracted and this was placed in a centrifuge tube containing 1 cc. of sterile 10 per cent. citrate of soda solution. The mixture was centrifuged for about 10 minutes at 1,500 revolutions per minute. The supernatant fluid was removed to another tube by means of a pipette and again centrifuged for a similar period. The fluid was again transferred to another tube and centrifuged a third time till a whitish deposit had formed. In this deposit the spirochaetes described in the paper were found. They were discovered in both the cases investigated.

Some of the deposit was inoculated into a guinea-pig, which became infected with the spirochaete. The strain was passed through a series of ten animals, after which it ceased to be infective. At first the virus appeared to increase in virulence, for at the third passage the animals developed haematuria, which is the chief characteristic of the infection, as well as congestion of the organs and haemorrhagic extravasations. Jaundice, which is such a notable feature of infection with leptospira of Weil's disease and yellow fever in guinea-pigs, was not noted. Attempts to obtain a culture of the organism were not successful. In one case a guinea-pig was inoculated intraperitoneally with virus from another animal and at the same time with 1 cc. of the patient's serum subcutaneously. The animal died on the 11th day from some unknown cause. It had not acquired the spirochaetal infection so that it appeared that the serum had protected it against infection. Two control animals which did not receive the serum acquired a fatal infection.

The question of the relationship of the spirochaete is discussed. The authors conclude that blackwater fever is not due to one cause but that it is a symptom of several diseases. The organism discovered by them is regarded as being the etiological factor in one of the types of haemoglobinuric fever. They lay great stress on the occurrence of haematuria in the guinea-pigs and explain the absence of haemoglobinuria as the direct outcome of the high alkalinity of the urine of the rodents as compared with that of man. Reference is made to SCHUFFNER's discovery (this *Bulletin*, Vol. 13, p. 300) of spirochaetes in the blood of a case of infectious jaundice associated with haemoglobinuria in Sumatra. This observer considered he was dealing with a new disease and named his organism *Spirochaeta biliohaemoglobinuriae*. Blanchard and Lefrou accept this name for the organism which they describe.

The paper contains a table in which the various spirochaetal diseases of man, their chief symptoms and the character of the associated spirochaetes are clearly detailed. Reference is here made to a spirochaete found in an infectious jaundice of the Congo. This disease is said to have been transmitted from guinea-pig to guinea-pig by means of bed bugs even 38 days after a feed on an infected animal. This disease appears to be the same as that referred to by these authors and LAIGRET in the paper reviewed in this number of the *Bulletin*.

The experiments recorded in this paper appear to have been carefully carried out, but it is evident that further investigations on the lines indicated are required. The fact that a second spirochaetal disease is described and that this as well as Weil's disease occurs in the Belgian Congo where the two cases of blackwater fever were investigated shows that spirochaetal infections of this type are more common than has been expected. It is to be noted that no account is given of any attempts to discover similar organisms in healthy persons or those suffering from other diseases by the methods described in the paper, so that the two isolated observations on blackwater fever cases lack adequate control.

C. M. W.

LEGER (Marcel) & BÉDIER (E.). **Passage du *Spirochaeta crocidurae* à travers le placenta.**—*C.R. Soc. Biol.* 1922. Oct. 21. Vol. 87. No. 30. pp. 949–950.

It was shown by Leger (1917) that the rodent *Crocidura stampflii* is not infrequently found naturally infected with a spirochaete which resembles the relapsing fever spirochaetes of man. It is inoculable to rats and in these animals the authors have maintained the strain. They now note that this organism, which they named *Spirochaeta crocidurae*, is able to pass from the mother to the foetus. One of the rodents which was killed in gestation was found infected and in the heart blood of five foetuses the spirochaetes were found in larger numbers than in the blood of the mother. It was shown by BREINL and KINGHORN (1906) that *Spirochaeta duttoni* was able to pass the placenta in experimentally infected rats, while NATTAN-LARRIER (1911) showed that though spirochaetes were often apparently absent from the foetal blood their presence could be demonstrated by inoculating the blood to rats.

C. M. W.

SANGIORGI (Giuseppe). **Le spirochetosi dei muridi. Nota 2a (Proposta del sottogenere "Treponemella").**—*Pathologica.* 1922. Aug. 1. Vol. 14. No. 329. pp. 461–463. With 1 text fig.

Having discovered in the heart blood of a mouse a small spirochaete with terminal flagella, the author again discusses the various spirochaetes which have been found in rats and mice (see this *Bulletin*, Vol. 19, p. 558). He now introduces a new name, *Treponemella*, for certain forms, one of which is the *Spirochaeta laverani* of BREINL and KINGHORN, while he places in the genus *Spironema* the *Spirochaeta muris* of WENYON. As pointed out in the previous review, these spirochaetes are identical, as they were described from the same material which the reviewer studied in Paris. MESNIL in a paper reviewed in this number, notes that these small organisms are probably not spirochaetes at all, but spirilla.

C. M. W.

CASTELLI (Giorgio). **Dei ceppo recidivi nella infezione sperimentale da** *Spironema recurrentis.*—*Boll.d. Istituto Sieroterapico Milanese.* 1917. Nov. Vol. 1. No. 2. pp. 57–74. [Received Oct. 16, 1922.]

INFECTIOUS JAUNDICE

MANSON-BAHR (Philip). **A Case of Weil's Disease Occurring in London. With an Account of a Laboratory Examination of the Case by** WENYON (C. M.) & BROWN (H. C.).—*Lancet.* 1922. Nov. 18. pp. 1056–1059. With 3 charts in text.

The paper describes a typical case of Weil's disease in a seaman aged 39 years. Diagnosis was made by the discovery of the leptospira and the production of a virulent infection in guinea-pigs inoculated with the urine, vein, blood and blood from the liver. Cultures of the organism were obtained in rabbit blood agar.

The case is of interest in that it appears to be the first properly diagnosed indigenous case in England. The only apparent source of infection was Thames water, the patient having imbibed considerable quantities a week before his illness commenced when he fell into the river. Notable features of the case were almost complete deafness during the initial pyrexia, intense muscular and joint pains and very evident pharyngitis and post-nasal catarrh. The author draws special attention to the last-mentioned condition, and though it appears to have been noted in none of the cases hitherto described, he thinks it suggests a possible path of entry of the organism from the mouth.

The patient had a definite relapse with an apyrexic interval of four days. After the second attack he made an uninterrupted recovery, the whole illness lasting 20 days.

The strain of the leptospira isolated in cultures from the inoculated guinea-pigs produced virulent infection in these animals. The patient's serum (0·5 cc.) completely protected these animals against infection not only of the patient's strain of leptospira but also against a strain isolated previously from English rats and the leptospira of yellow fever.

C. M. Wenyon.

INADA (Ryokichi). **Prophylaxis and Serum Treatment of Spirochaetosis icterohaemorrhagica.**—*Japan Med. World.* 1922. July 15. Vol. 2. No. 7. pp. 189–193.

We learn from this paper that prophylactic measures against Weil's disease have been in operation in Japan for some years. By the use of a vaccine it is claimed that the disease can be materially controlled. In a locality where the incidence was 15 to 30 cases a month, after the inoculation of 314 individuals there were only 5 cases in three months. At the Tagawa mine in 1919 there were 2,211 men who received one injection and 1,706 who had two: amongst the uninoculated the disease continued to occur frequently, whilst amongst the inoculated there were only three cases, two of which occurred before immunity had time to develop.

During the period July, 1919, to January, 1921, 10,268 men at the mine were inoculated. Of 47 cases of the disease which occurred in this period only 5 were amongst the inoculated. The inoculated group in August and September, 1920, comprised 4,262 men and the uninoculated 5,106 men.

It was found that the organism of the disease was killed in soil if lime nitrogen fertilizer was applied. Over a certain area of fields 41 lb. per acre were spread in 1920. Though 3,389 men and women were working in these fields no one contracted the disease, whereas in surrounding untreated fields many cases occurred. Further prophylactic measures adopted were the extermination of rats and the draining of mines, it having been noted that the disease did not occur in dry mines.

Treatment of cases by subcutaneous and intravenous injections of serum of immunized horses has been in use in Japan for over five years. It is claimed that good results have been obtained. Of severe cases the death-rate was 57·1 per cent. before serum treatment was introduced, while afterwards it was reduced to 34·7. Apart from the death-rate the symptoms are definitely mitigated by the intravenous use of serum in that fever more rapidly disappears, haemorrhages are less severe, while jaundice does not last so long. Abscess formation is a common feature of the disease, occurring in 24 per cent. of the cases which had no serum. In those which received an injection during the first six or seven days it was noted in only 4·9 per cent.

C. M. W.

GHETTI (Giorgio). **Spirochetosi ittero-emorragica sperimentale in giovani caprini.**—*Ann. d'Igiene.* 1922. June. Vol. 32. No. 6. pp. 513–516.

Previous attempts to infect goats with *Leptospira icterohaemorrhagiae* have not been successful. The author of this paper has, however, succeeding in infecting young animals. Two which were inoculated subcutaneously and intraperitoneally did not become infected, whereas two which were inoculated into the trachea acquired the disease, from which, however, they recovered. During the infection the animals suffered from fever and jaundice while the leptospira was present in the blood.

C. M. W.

VANNI (V.). **Sulla spirochetosi ittero-emorragica.**—*Policlinico.* Sez. Prat. 1922. Aug. 7. Vol. 29. No. 32. pp. 1038–1040. With 2 text figs.

The paper gives a record of a fatal case of jaundice. Guinea-pigs were inoculated and cultures of the organism obtained. There seems

to be some doubt as to the diagnosis, for some of the author's remarks lead one to suspect that all the structures described as spirochaetes were not actually such. The figure of a section of the liver which was stained by Giemsa stain shows filaments coloured far too intensely. It is exceedingly difficult to stain the spirochaetes in sections at all except by the silver nitrate method. Similarly the dark-ground illumination is said to have shown that most of the spirochaetes were adherent to the red cells, a picture so unusual that one is inclined to think that these were the filaments which are commonly seen attached to red cells in normal blood. Similarly the figure of the section of a guinea-pig's liver is far from convincing. That the inoculated guinea-pigs died without showing jaundice or the extensive extravasations of blood so characteristic of infections with the spirochaetes of Weil's disease is rather remarkable.

C. M. W.

Blanchard, Lefrou & Laigret. **Note préliminaire sur des cas d'ictères épidémiques observés à Brazzaville (A. E. F.).**—*Buli. Soc. Path. Exot.* 1922. June 14. Vol. 15. No. 6. pp. 385–387.

The authors state that towards the end of the year 1921 and beginning of 1922 Dr. Laigret called attention to cases of infectious jaundice which occurred amongst natives in the Congo. The cases were of two types. The one was severe, with ictero-haemorrhagic symptoms and a yellow fever syndrome including black vomit, while the other was mild and resembled pneumonia complicated with jaundice. It appeared that in some cases the infection had been contracted in hospital. As regards the possible relationship to relapsing fever it is noted that this disease, though present previously, had ceased to occur before the end of the year, while jaundice had never been seen as a complication. Examination of the cases of jaundice led to the discovery of spirochaetes on four occasions (twice in urine, once in blood and urine and once in smears of liver). These were always scanty and in the fluids and were only found after centrifuging. They measured 7–12 μ in length and were very fine. In some the spirals were not evident, while in others they were definite.

From the case in which spirochaetes were found in both the blood and urine a guinea-pig was inoculated with blood. On the 20th day spirochaetes like those found in the blood of the patient were present in the blood of the guinea-pig. The animal died on the 25th day with marked jaundice and conjunctivitis. The organisms were present in the liver, kidneys and urine. A guinea-pig was successfully sub-inoculated.

Bed bugs to the number of 16 were collected from the bed of the patients and were crushed in saline solution. No spirochaetes were found in the emulsion which, however, produced an infection in guinea-pigs which was carried on through three passages. A guinea-pig inoculated with emulsion of bugs collected at a distance from the hospital did not become infected.

The two viruses obtained from the patient and that from the bugs were identical both as regards the disease they produced in the animals and in the morphology of the spirochaetes.

The infection resembles that of *L. icterohaemorrhagiae* but differs in the fact that bugs appear to act as reservoirs of the virus and that the disease responds to treatment with arsenicals.

C. M. W.

Zuelzer (Margarete). **Freilebende Wasserspirochäten als Krankheitserreger.** [Free Living Spirochaetes in Water as Disease Producers.]—*Cent. f. Bakt.* 1. Abt. Orig. 1922. Oct. 24. Vol. 89. No. 1/3. pp. 171–175.

The discovery of spirochaetes in water, which resembled morphologically those of Weil's disease, has led to an investigation of their pathogenic properties. Cultures of these water spirochaetes were obtained in media which grow the similar organisms from cases of the disease and these were tested on guinea-pigs. Of six strains isolated from tap water it was found that only one was pathogenic to these animals, and that the symptoms and lesions corresponded with those produced by *Spirochaeta icterohaemorrhagiae*. The strain was also pathogenic to mice, and it was found that the virulence of the strain was not lost by successive sub-cultures in artificial media, though larger doses of culture were required to infect the animals.

Several observers have drawn attention to the close association of Weil's disease with dirty water and cases have been quoted in which it appears that the infection has been directly contracted from such a source. The discovery of a strain of water spirochaetes which not only morphologically but in their pathogenicity to animals appear identical with that of Weil's disease demonstrates that an apparently harmless free-living organism may, under certain conditions, acquire pathogenic properties.

C. M. W.

i. Ducamp, Carrieu & Gueit. **A propos d'un cas de spirochétose ictéro-hémorragique.**—*Bull. Acad. Méd.* 1922. Apr. 18. 3rd Ser. Vol. 87. No. 16. pp. 427–428.

ii. Sigalas (R.) & Pirot (R.). **Présence de *Spirochaeta icterohemorragiae* chez les rats de Bordeaux.**—*C.R. Soc. Biol.* 1922. June 17. Vol. 87. No. 22. pp. 195–197.

i. The paper gives a description of a case of infectious jaundice which, though clinically typical, gave only negative results as regards actual spirochaetes and inoculation of guinea-pigs. A serological test against the organisms of Weil's disease gave a positive reaction in a dilution of 1 in 500.

ii. The authors have demonstrated by inoculation of guinea-pigs that rats in Bordeaux harbour *Spirochaeta icterohaemorrhagiae*. Two were found infected out of 33 examined.

C. M. W.

i. Saka (Masayoshi) & Miyanaga (Ichiro). [**On the Pure Cultivation of *S. icterohemorrhagiae* in the Fluid Medium.**]—*Aichi Igakkwai Zasshi* (*Jl. of Aichi Med. Soc.*). 1922. Mar. Vol. 29. No. 2. [Summarized in *Japan Med. World.* Tokyo. 1922. Aug. 15. Vol. 2. No. 8. p. 243.]

ii. Saka (Seigi). [**Comparative Studies on the Proofs of the Immune Bodies in the Anti-ictero-hemorrhagic Serum.**]—*Aichi Igakkwai Zasshi* (*Jl. of Aichi Med. Soc.*) 1922. May. Vol. 29. No. 3. [Summarized in *Japan Med. World.* Tokyo. 1922. Sept. 15. Vol. 2. No. 9. p. 265.]

iii. Katayama (Takeichi). [**On the Blood Features, especially Blood Platelets, in Experimental Weyl's Disease.**]—*Aichi Igakkwai Zasshi* (*Jl. of Aichi Med. Soc.*). 1922. May. Vol. 29. No. 3. [Summarized in *Japan Med. World.* Tokyo. 1922. Sept. 15. Vol. 2. No. 9. p. 265.]

i. This note merely states that the authors have shown that the most suitable liquid media for the cultivation of *Leptospira icterohaemorrhagiae* are 5–10 per cent. of acacia or 2 per cent. of "funori" or gloiopeltis glue.

ii. The presence of immune bodies in the serum of cases of Weil's disease can readily be demonstrated by the agglutination test as carried out by Ohba. In the experimental disease it is the earliest sign of infection.

iii. As in the case of Weil's disease, there is a decrease in the number of platelets in the blood in simple obstructive jaundice. It follows, therefore, that the decrease in Weil's disease is merely a result of the jaundice and has no specific meaning.

C. M. W.

Inada (Ryokichi), Ido (Yutaka), Kaneko (Renjiro), Hoki (Rokuro), Ito (Hiroshi), Wani (Heditsune) & Okuda (Kikuzo). **Sulla scoperta della *Spirochaeta ictero-haemorrhagiae*, nuovo agente patogene della cosidetta malattia del Weil nel Giappone e sulle più recenti ricerche su questa malattia.**—*Boll. d. Istituto Sieroterapico Milanese.* 1917. Mar. Vol. 1. No. 1. pp. 1–9. With 1 plate. [Received Oct. 16, 1922.]

Inada (Ryokichi), Ido (Yutaka), Hoki (Rokuro), Ito (Hiroshi) & Wani (Hidetsune). **La sieroterapia endovenosa della mallatia di Weil (*Spirochetosi ittero-emorragica* Inada).**—*Boll. d. Istituto Sieroterapico Milanese.* 1917. Nov. Vol. 1. No. 2. pp. 111–129. (Received Oct. 16, 1922.]

Kaneko (Renjiro) & Okuda (Kikuzo). **Sulla distribuzione della *Spirochaeta ictero-haemorrhagiae* negli organi dei pazienti trattati con la sieroterapia endovenosa.** *Boll. d. Istituto Sieroterapico Milanese.* 1917. Nov. Vol. 1. No. 2. pp. 131–134. [Received Oct. 16, 1922.]

YELLOW FEVER.

Peterson (E.). **Yellow Fever in St. Thomas, with Special Reference to its Spontaneous Elimination.**—*U.S. Nav. Med. Bull.* 1922. Oct. Vol. 17. No. 4. pp. 555–570.

Yellow fever, which was formerly endemic in the island of St. Thomas in the West Indies, gradually disappeared without any active steps having been taken to eradicate it. The paper traces the history of the disease in the island since the first available record in 1702. Details are given of the number of deaths which occurred during the 50 years following 1852, when certain records were commenced in St. Thomas. The island was originally of some strategic importance and served as a station for troops, so that one of the factors necessary for the continuance of the disease in the shape of constant importation of non-immunes existed. The stegomyia was present as also the virus, so that cases of the disease occurred more or less continuously. The island lost its position as a strategic post and the influx of susceptible adults through shipping gradually diminished. The result of the reduction in the number of non-immunes and the acquirement of a permanent immunity by the inhabitants has led to the disappearance of yellow fever from the island—the new-born being insufficient in numbers to keep the endemic alive. The author sees in the history of the island an illustration of the principles laid down by H. R. Carter [see this *Bulletin*, Vol. 17, p. 384.] If yellow fever holds its own it is evident that three factors are present, namely mosquitoes, virus and non-immunes. The number of mosquitoes necessary to maintain the disease varies with the number of non-immunes present. The minimum number of mosquitoes necessary in any locality is the critical

number, and this becomes less or greater as the number of non-immunes is increased or diminished. If the disease is just maintaining itself then the mosquitoes are near the critical number, so that yellow fever loses ground if the number of non-immunes is reduced or if the mosquitoes fall below the critical limit. In St. Thomas it appears that the latter occurred, so that yellow fever was spontaneously eliminated.

C. M. Wenyon.

Vieira (Borges). **Pesquizas sobre a etiologia da febre amarella na zona de Nazareth, Estado da Bahia, em 1921.**—*Bol. Soc. Med. e Cirurg. de S. Paulo.* Brazil. 1921. July & Aug. Vol. 4. 2nd Ser. Nos. 5 & 6. pp. 137–144.

An account of the author's investigation, at the request of Dr. Carlos Chagas, of an outbreak of yellow fever in the district of Nazareth, State of Bahia, Brazil, in May 1921. The author had had the advantage of working at New York with cultures of *Leptospira icteroides* isolated by Noguchi. The outbreak, though in Vieira's opinion one of genuine yellow fever, was, on the whole, of benign type, and attempts to isolate the Leptospira from the blood of those suffering were uniformly unsuccessful, as, also, were inoculation experiments on guinea-pigs and immunization experiments on Pfeiffer's lines with serum from recent patients and cultures of *Leptospira icteroides* from Noguchi's laboratory. The epidemic was waning when the author arrived to investigate it and the absence of positive microscopical experimental results may be perhaps attributed to the small number of cases observed and to the fact that none were seen in the earliest phase of the disease.

F. S. Arnold.

Barreto (A.). **Febre amarella no nordeste brasileiro.** [Yellow Fever in North Eastern Brazil.]—*Arch. Brasileiros de Med.* 1921. Mar. Vol. 11. No. 3. pp. 205–244. With 2 figs. in text.

The author gives an account of two epidemics which he investigated in 1919 and 1920 in North Eastern Brazil. He concludes that the disease, which attacked children as frequently and as virulently as it did adults, was typically yellow fever. Malaria was excluded by examination of the blood, and Weil's disease by the rapidity with which the serious cases succumbed. The disease in children is frequently certified as pernicious malaria, infantile cholera, intestinal auto-intoxication and other conditions.

C. M. W.

Zapata (Carlos Enrique). **La fiebre amarilla en Piura. Breves consideraciones acerca de su naturaleza.**—*An. Facul. de Med. de Lima.* 1920. Nov.–Dec.; 1921. Jan.–Feb. Vols. 6 & 7. Nos. 18 & 19. pp. 208–231. With 1 map. pp. 32–46. With 1 chart in text.

The history of the yellow fever epidemic which occurred in Peru has already been given by H. R. Carter (this *Bulletin*, Vol. 19, p. 568). The author of the present paper describes the outbreak as it affected the Province of Piura, especially its principal town, Paita. The measures directed against the mosquito and the immediate isolation of all suspicious and authentic cases resulted in the disappearance

of the disease in Paita itself, but owing to the failure of the people in the outlying districts to cooperate in the prophylactic measures the disease was still extant in the province at the time the paper was written.

C. M. W.

Noguchi (Hideyo) & Pareja (Wenceslao). **Prophylactic Inoculation against Yellow Fever.**—*Jl. Amer. Med. Assoc.* 1921. Jan. 8. Vol. 76. No. 2. pp. 96–99. [Received Oct. 1922.]

This paper, which was published before the one reviewed in the *Bulletin*, Vol. 18, p. 249, gives an account of experiments conducted on guinea-pigs with the object of determining the protective power of a vaccine of *Leptospira icteroides*. It was demonstrated that when sufficient quantities of killed cultures were given the animals were usually resistant to subsequent inoculation with *Leptospira icteroides*. The degree of protection, however, was not proportional to the quantity of vaccine given. The result of the trial of the vaccine in human beings in Guayaquil is also mentioned but these results have been more fully noted in the later papers reviewed in the *Bulletin*.

C. M. W.

Noguchi (Hideyo). **Etiology of Yellow Fever. XIV. Duration of the Protective Effect of Anti-Icteroides Immune Serum after Subcutaneous Inoculation into Animals.**—*Jl. Experim. Med.* 1922. Sept. 1. Vol. 36. No. 3. pp. 357–364.

Reference is made to 187 cases of yellow fever treated by immune horse-serum. The results have already been noted [this *Bulletin*, Vol. 19, pp. 563–564]. Owing to the fact that amongst groups of individuals who have been injected with a vaccine of *Leptospira icteroides* a certain number may contract the disease within 13 days of vaccination, and as the incubation period of yellow fever is six days, it became evident that infection must have taken place in some instances while protection was developing.

A series of experiments was conducted with the object of determining if it would be possible to confer an immediate protection by the injection of immune serum. Guinea-pigs were injected with varying quantities of serum and subsequently inoculated at different intervals with a virulent strain of *Leptospira icteroides*. By the administration of a dose of serum so minute as 0·002 cc. per kilogram of body-weight a complete protection lasting five days was immediately produced. After this period the protection was rapidly lost. To maintain an immunity of 10 days' duration it was necessary to administer 0·2 cc. of serum.

It appears from these results that theoretically it would be necessary to give a man of 80 kilos an injection of 0·16 cc. of serum to produce an immunity of five days' duration, or 1·6 cc. for one of seven days, or 16 cc. for one of 10 days.

C. M. W.

Wilkinson (E.). **Notes on Two Cases reported as Yellow Fever.**—*Proc. Roy. Soc. Med.* (Sect. of Trop. Dis. & Parasit.). 1922. Aug. Vol. 15. No. 10. pp. 48–52.

The paper describes two instances of outbreaks of disease, in some cases terminating fatally, on board ships returning from West Africa,

which were at first suspected to be yellow fever and were reported to the Ministry of Health. In both instances careful investigations proved that the disease was malignant tertian malaria. The diagnosis of one case was complicated by the presence of an inguinal bubo in which an organism resembling *Bacillus pestis* occurred. It was proved by animal inoculations to be some other organism.

C. M. W.

Hoffmann (W. H.). **La profilaxia de la fiebre amarilla.** [The Prevention of Yellow Fever.]—*Rev. Méd. de Hamburgo.* 1922. Vol. 3. No. 8. pp. 218–220. With 1 text fig.

A brief review of the subject of yellow fever, its causes and prevention, entering also again into the question whether the *Leptospira icteroides* is the causative organism of this disease or not, and casting doubt on the value of Noguchi's prophylactic injection, since this is always accompanied by other measures such as isolation of the sick, destruction of mosquitoes, and so forth. [See previous numbers of this *Bulletin.*]

H. Harold Scott.

Hoffmann (W. H.). **The Histopathology and Haematology of Guinea-Pigs infected with** *Leptospira icteroides.*—*Jl. Trop. Med. & Hyg.* 1922. Nov. 15. Vol. 25. No. 22. pp. 353–360.

——. **Estudios experimentales sobre las leptospirilosis.**—Reprinted from *Rev. Méd. de Hamburgo.* 1922. Vol. 3. No. 3. pp. 80–81.

——. **Estudios comparativos de la sangre en las infecciones experimentales con** *Leptospira icteroides* **y** *Leptospira icterohaemorrhagiae.*—*Laboratoria de Investigaciones y Estudios.* Habana, Cuba. 1922. 11 pp. With 21 charts.

The contents of these papers appear to be the same as of that reviewed in this *Bulletin,* Vol. 19, p. 565.

C. M. W.

Carter (H. R.). **La epidemia de fiebre amarilla en el Perú durante los anos 1919 y 1920.**—*Cronica Med.* 1922. Aug. Vol. 39. No. 710. pp. 297–311.

LEPROSY.

ROGERS (Leonard). **An Address on the Spread, probable Mode of Infection, and Prophylaxis of Leprosy.**—*Brit. Med. Jl.* 1922. June 24. pp. 987–990.

The author began his address with a brief historical review of leprosy and its passage to new countries. The disease as it more or less disappeared from England and most parts of Europe advanced eastward, reaching the islands of the Pacific in the second half of the last century. The hereditary theory of infection is now entirely discredited and it is seen to be contagious. HANSEN discovered the *Bacillus leprae* and refuted the hereditary theory in the years 1874 to 1879. Leprosy is not influenced by climate and is found from Iceland to the Equator; nevertheless, it seems to be more virulent in tropical areas. Under the heading "Modes of Infection," a most interesting table is given :—

Table of 700 *Recorded Cases of the Probable Source of Infection in Leprosy.*

Mode of Infection.	Number.	Percentage.	
Conjugal	85	12·14	18·28
Cohabiting	43	6·14	
House	180	25·7	39·84
Room	35	5·0	
Bed	64	9·14	
Attending on Lepers	139	19·87	19·87
Leper Playmate	23	3·28	19·42
Close Association with Leper	113	16·14	
Wet Nurse	8	1·14	2·59
Wearing Leper's clothes	3	0·43	
Vaccination	4	0·59	
Inoculation from Leper	3	0·43	

"In considering these figures it is worth recalling that the stock arguments of the anticontagionists were that the disease was rarely transmitted from husband to wife and *vice versa*, and was very rare among attendants on lepers, yet my table shows that almost one-fifth of the recorded infections fall into each of these two classes . . . the outstanding feature of the analysis is that in the very great majority of the cases there were frequent and prolonged opportunities of contact in a house inhabited by a leper . . . "

The author next considers the precise manner in which the leprosy bacilli pass from one person to another : it may well be either through their ingestion in food or by inoculation through some minute abrasion in the skin or in a mucous membrane such as that of the nose, mouth and gastro-intestinal canal, as in many cases of tubercle. [*B. leprae* is acid-fast as is the bacillus of tubercle.]

"The frequency with which anaesthetic leprosy beginning in the lower extremities, has been observed in bare-footed races, as in Crete, Java, Abyssinia, the Sudan, etc., is only readily explainable on the inoculation theory. . . "

"Of great significance in this respect is the strong suspicion that in rare instances leprosy has been transmitted by arm-to-arm vaccination, as in Professor Gairdner's cases of a European child developing leprosy after being vaccinated from a native child of leprous family in the West Indies, and another European child vaccinated from the first showing the disease after his return to England; and those of Hillis, in which a brother and sister of a Portuguese family both got leprosy after vaccination from the same source."

The principles of prophylaxis and causes of failure bear out the necessity for early segregation. "By far the most infective type of leprosy is the tubercular [nodular is a better term and avoids any confusion with true tuberculosis] form, including mixed cases with discharge of large numbers of bacilli from the nose and breaking down nodules."

Sir Leonard Rogers is one of those intimately connected with the fortunate advance in the treatment of leprosy and the last paragraph in this address is perhaps the most interesting and important :—

"Now that we possess in the soluble preparations of the active unsaturated fatty acids of chaulmoogra, cod-liver, soya bean and other oils introduced by me, a reliable method of clearing up the bacillus-bearing lesions of leprosy, with loss of infection, including cessation of the discharge of the organisms from the nose, lepers have for the first time a powerful incentive to come forward for treatment as early as possible instead of hiding their terrible calamity."

J. H. Tull Walsh.

Talwik (S.). [**La lèpre dans la Province de Oesel. Recherches épidémiologiques avec une introduction historique.**] 1921. Dorpat. 1 Vol. 209 pp. [Summarized in *Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 7. pp. 219–221 and *Bull. Office Internat. d' Hyg. Publique.* 1922. June. Vol. 14. No. 6. pp. 725–726.]

The author writes from an experience of 18 years in the Oesel district of Esthonia, including charge of the leper asylum. A study of old documents shows that leprosy has persisted in the Baltic Provinces since it was introduced by German Crusaders in the 12th century, and a table of 437 cases since 1818 shows 62·23 per cent. to have been females, an unusual predominance which he attributes to many of the males going abroad to work in the spring. Nodular cases formed 55 per cent. of the whole and especially predominate in newly affected parts where the disease is increasing. He has met with 10 abortive cases undergoing complete cure. In 115 marriages conjugal infection only occurred in 4·75 per cent. and in only 3 per cent. of nodular cases, and the author asks whether this may be due to gradual immunization by small quantities of the germs. The proportion of lepers increased from 20 to 60 years of age and then decreased. Isolation has been carried out since 1892, the largest number being reached in 1904 with 95 cases, decreased to 62 in 1920, 79 per cent. of the cases being interned. Nodular cases have increased and the cases occur in groups of 2 to 10, 69 of 375 villages being infected, nearly three-fourths being confined to a small area of the district, while the cases are concentrated in one or two houses in each village. Where the husband is a leper twice as many households have no children than where the wife is leprous, and 5·4 per cent. of the children are affected where the father is a leper and 7·1 when the mother is a leper; 96·3

per cent. of contagions were in relation to nodular cases, two-thirds from recent cases and one-third from cases of over six years' duration, while the nervous form was but slightly contagious. For prophylaxis, tracing and interning cases are the most important means.

L. Rogers.

SPIRE. **La lèpre au Dahomey.**— *Ann. de Méd. et de Pharm. Colon.* Paris. 1921. Apr.–May–June. Vol. 19. No. 2. pp. 166–172.

Leprosy occurs in all parts of Dahomey, but is most prevalent in the North, especially in the circles of Djoujou and Savalou. It decreases as the coast is approached, which supports the theory of TEXIER that the disease was imported by caravans going from Sokoto to the Gold Coast, the total estimated number of cases being 7,700, of which 5,500 are in the above mentioned circles. The contagiousness of the disease is generally recognized and creditors instal lepers at the doors of their debtors in order to obtain payment of their dues. When lepers are attacked by smallpox the lesions disappear temporarily only. Some of the tribes have little fear of leprosy and permit the healthy to marry the diseased, but others forbid such marriages and isolate cases in the forest, taking food out to them, while it is believed to be dangerous to pick up a needle dropped by a leper. Nodular cases are a little more common than nerve cases. Notification of lepers is compulsory and some efforts have been made at isolation without much success, as the people object to any interference with their liberty, but it is now proposed to found leper colonies with land for cultivation.

L. R.

PUBLIC HEALTH REPORTS. 1922. June 2. Vol. 37. No. 22. p. 1313. **—Leprosy in Para, Brazil.**

Dr. H. C. de Souza ARAUJO records that in March 1922 there were 1,135 known lepers in the City of Pará and 104 more cases in the interior of the State, notification and supervision being compulsory, but only 255 were isolated in a hospital and 66 in their houses, the rest being free but under supervision. Treatment with chaulmoogra oil was being carried out, 16,727 injections being reported to date with favourable results. A hospital for isolating all the lepers is under consideration.

L. R.

CORLETT (William Thomas). **The Present Status of Leprosy in the Hawaiian Islands.**— *Arch. Dermat. & Syph.* 1922. Nov. Vol. 6. No. 5. pp. 607–615. (Discussion, pp. 615–618.)

A brief history of leprosy in the Sandwich Islands is first given from the great increase of the disease in the middle of the 19th century following the advent of numerous Chinese, the foundation of an observation and detention hospital at Kalihi near Honolulu and of the Molokai leper settlement on an isolated promontory eight square miles in extent in 1865. Here 1,587 lepers were received in the next ten years, although the yearly numbers admitted in the first two decades varied between 487 in 1873 and 43 in 1886 with alterations in the policy of different Governments, for as MOURITZ in his History

of Leprosy in the Hawaiian Islands states "The segregation of lepers has been irregular, spasmodic, and efficient only at certain periods . . . The efforts to stamp out leprosy by segregation have taken on the status of a political football . . . and to placate voters and gain their votes the enforcement of the segregation law has been purposely allowed to lapse temporarily." Since then federal control has been partially accomplished, but confusing and conflicting reports by interested parties have been published from time to time. Even after the United States took over the Islands an attempt adequately to equip Molokai was frustrated by a change of national policy: all facts of great importance in judging of the limited effects of the segregation policy in Hawaii.

The treatment of leprosy by chaulmoogra oil is next considered. POWER separated certain fatty acids in 1904. The ethyl esters patented in 1910 as antileprol were used in Turkey and Egypt and in Hawaii from 1910 to 1914 and later by DEAN in 1919 with about the same results that ROGERS was getting in India. Between July 9, 1919, and March 31, 1921, 140 patients were paroled from the Kalihi hospital and 60 discharged from the Molokai settlement, but 16 of the former and 11 of the latter are known to have relapsed and longer treatment with greater caution in giving parole is now adopted. Owing to the efficient services of the board of health there are fewer lepers at large in Hawaii than in other countries with as many lepers, and early cases are coming forward in much larger numbers for the improved treatment. During the last few months the ethyl esters have been given in selected cases intravenously in 1cc. doses two or three times weekly. [MUIR in Calcutta has long used this preparation intravenously in resisting cases.] The precise mode of dissemination of the disease is still unknown, and further research is required.

L. R.

DE LANGEN (C. D.). **De Leprabestrijding in de Sandwich-eilanden.** [The Combating of Leprosy in the Sandwich Islands, Hawaii.] —*Geneesk. Tijdschr. v. Nederl.-Indië.* 1922. Vol. 62. No. 2. pp. 212–223. With 1 chart.

During a visit to Honolulu the author studied the measures taken there in the leprosy campaign. DEAN showed him the preparation of the new drugs from the crude chaulmoogra oil (the chemical details are given in the chart). De Langen is sceptical whether real cures have been obtained. In many cases, discharged "on parole," he thinks the bacillus might be found by repeated examination. Anyhow, prolonged treatment remains always necessary. About one-fourth of the patients show important reactions after the injections. The psychical condition of the patients is excellent, because the prospect of healing and discharge "on parole" takes away a good deal of the gloom of the disease. The infirmaries are well built and well managed.

W. J. Bais.

VAN DRIEL (B. M.). **Over Behandeling en Bestrijding van Lepra.** [On Treatment and Combating of Leprosy.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1922. Vol. 62. No. 2. pp. 149–163.

The author reports on his experiments with "Collobiase de Chaulmogra" (Dausse, Paris; manufactured by Laboratoires Clin), which he found to be absolutely useless, even in doses much larger than those

recommended by the manufacturers. After considering the various preparations lately recommended for the treatment of leprosy he concludes that their efficacy is not yet beyond doubt. They are, moreover, expensive. In the leper colony, Lao Simomo, of which the author is in charge, he administers the crude chaulmoogra oil (15 parts mixed with 85 parts of coconut oil) in daily doses up to 10 cc. of the mixture. This is very cheap. He considers, however, the isolation of the lepers as of far greater importance. Lao Simomo is made as attractive as possible to the native lepers, thereby strongly promoting the thoroughness of the isolation. The money paid for the upkeep of such an institution is well spent, because "The leper colonies do not heal the lepers but they deliver the population from leprosy."

W. J. Bais.

HOFFMAN (Frederick L.). **Is Leprosy Increasing?—An Address delivered at a meeting of the American Medical Association, New Orleans, La.** 1920. Apr. 26. 53 pp. With 2 charts. Newark, N.J.: Prudential Press.

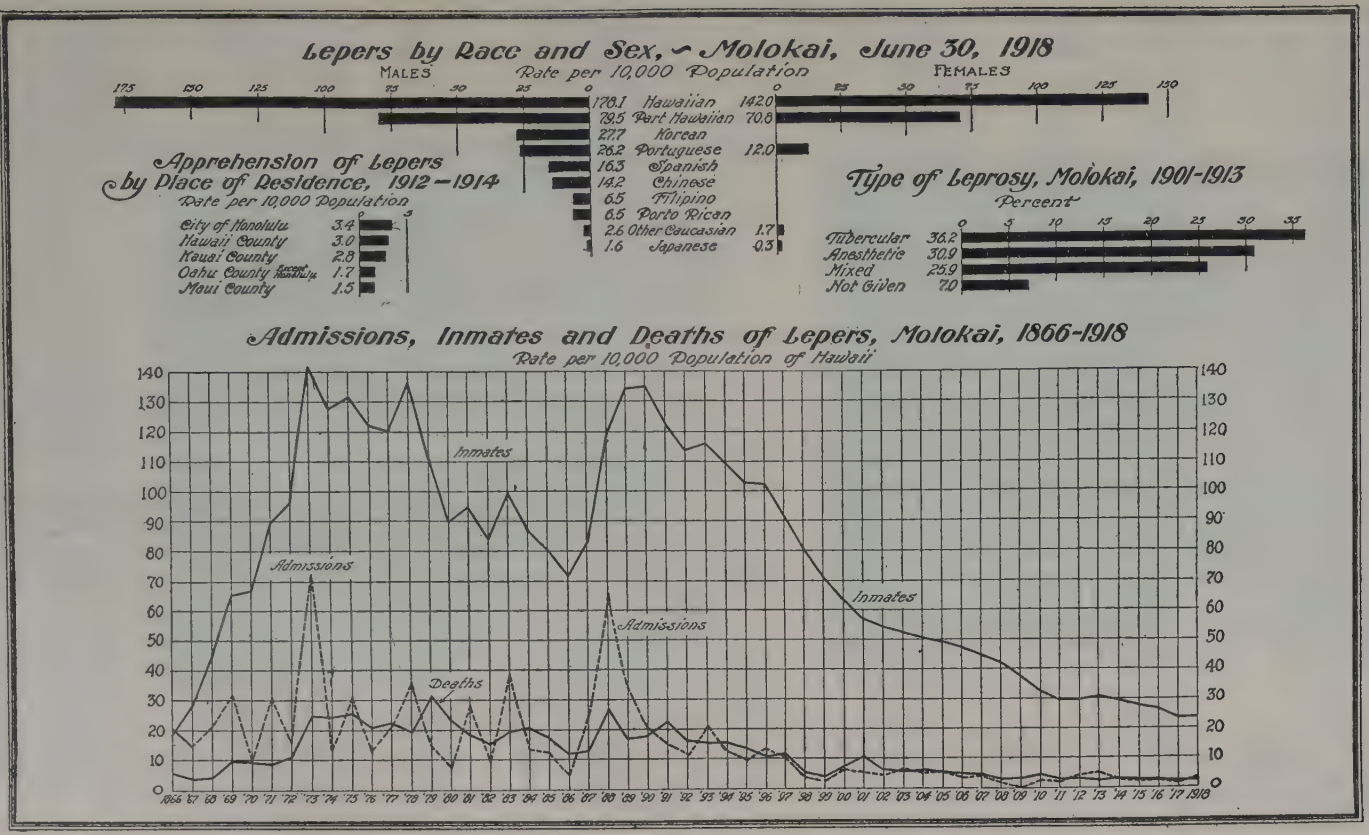
This paper deals at length with the prevalence of leprosy in the United States more particularly and in South America, and includes a list of nearly 250 cases reported in the United States between April, 1916, and April, 1920. The writer thinks there are probably 400 to 500 cases, and although this is a more conservative estimate than some earlier ones, he considers the disease is slowly increasing with the formation of new foci, and constitutes a serious menace. The bill enacted in February, 1917, providing $250,000 for a federal leprosarium has not yet been applied, but the site selected at Cedar Keys, Florida, seems likely to be adopted shortly. He thinks others should be provided on the Pacific and Atlantic coasts and in the Central West. The first leper home was established in Louisiana, where 80 per cent. of the lepers are white, although only 57 per cent. of the population is white, but more coloured cases are probably concealed as the average age on admission of the latter is higher than in the case of the whites, the greatest frequency of admissions being from 20 to 29 years and the duration of the cases 8–10 years. A chart illustrating the admissions to the Louisiana leper home shows some increase since 1909. Another chart (see opposite) shows for Molokai, Hawaii, the number of inmates, admissions and deaths yearly per 10,000 population from 1866 to 1918, which brings out very well the ill effects of fluctuating policies in the earlier years and the steady decline in leprosy during the last two decades under American control.

L. R.

NEVEU-LEMAIRE. **Les grandes endémo-épidémies inter-coloniales: la lèpre.**—*Presse Méd.* 1922. Sept. 20. Vol. 30. No. 75. pp. 1565-1573. With 5 text figs.

Leprosy is described as a chronic infectious disease the bacillus of which lives exclusively in the skin and nerves, possibly conveyed by biting insects or by acari. The well-known general distribution of the disease is mentioned, and that in the French Colonies described more fully, based on previous papers on the subject by JEANSELME and KERMORGANT. The most interesting feature of the paper is a map of Madagascar showing the leprosy rates per mille in the various

Leprosy in Hawaii


Lepers by Race and Sex, ~ Molokai, June 30, 1918
MALES
Rate per 10,000 Population
FEMALES
175 150 125 100 75 50 25 0 0 25 50 75 100 125 150
170.1 Hawaiian 142.0
79.5 Part Hawaiian 70.8
27.7 Korean
26.2 Portuguese 12.0
16.3 Spanish
14.2 Chinese
6.5 Filipino
6.5 Porto Rican
2.6 Other Caucasian 1.7
1.6 Japanese 0.3
Apprehension of Lepers by Place of Residence, 1912–1914
Rate per 10,000 Population
City of Honolulu 3.4
Hawaii County 3.0
Kauai County 2.8
Oahu County except Honolulu 1.7
Maui County 1.5
Type of Leprosy, Molokai, 1901-1913
Percent
0 5 10 15 20 25 30 35
Tubercular 36.2
Anesthetic 30.9
Mixed 25.9
Not Given 7.0
Admissions, Inmates and Deaths of Lepers, Molokai, 1866-1918
Rate per 10,000 Population of Hawaii
Inmates
Admissions
Deaths
Admissions
Inmates
140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
1866 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 1918

(Reproduced from Dr. F. L. HOFFMAN's publication, "Is Leprosy increasing?")

districts and bringing out the fact that all the areas with the high rates of from 5 to 10 per mille are in the eastern area, which has the highest rainfall. The writer concludes that the leprosy question in the French Colonies is a very serious one, as whites as well as natives are attacked, and many of the former return to France, especially to Paris, where no sanitary regulations can be enforced against them, so they may become a danger.

L. R.

DELAMARE (G.) & CHUKRI (Hassan). **Altérations radiologiques des mains et des pieds dans un cas de lèpre mutilante.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1922. Oct. 19. 3rd Ser. Year 38. No. 27. pp. 1321–1325. With 5 text figs.

—— & ——. **Altérations radiologiques des mains et des pieds dans un cas de lèpre mutilante avec lésions ainhumi-formes.**—*Ibid.* Nov. 2. No. 29. pp. 1396–1399. With 3 text figs.

These two papers include descriptions of the X-ray appearances of the hands and feet in two cases of anaesthetic leprosy showing the usual atrophy of the phalanges and osteoporosis, with escape of the articular surfaces, as pointed out by MANSON. The two illustrations reproduced opposite are more informing than any verbal description. One case somewhat resembled ainhum.

L. R.

DAVIS (Haldin). **Case of Leprosy.**—*Proc. Roy. Soc. Med.* (Sect. of Dermat.). 1922. Sept. Vol. 15. No. 11. p. 49.

This case is of interest on account of the probably very long incubation period of 21½ years. The patient was a woman, aged 68, a native of Riga, which she left 22 years ago. She has since lived in England and Philadelphia, where it is very improbable that she contracted the disease, which only appeared six months ago. It was at first mistaken for mycosis fungoides, but anaesthesia was present and the leprosy bacillus was found.

L. R.

WALLACE (Alexander). **Notes on an Unusual Case of Leprosy.**—*Southwestern Med.* 1922. May. Vol. 6. No. 5. pp. 193-196. With 1 text fig.

A Mexican waiter, aged 51, who came with paraesthesia around the left eye, which was diagnosed as syphilis, a positive Wassermann being present, as in 70 per cent. of lepers. He improved under arsenical injections. After 18 months he returned with typical macular and anaesthetic leprotic patches and facial appearance, leprosy bacilli being found in the lesions, and he did well on injections of chaulmoogra oil and ethyl ester chaulmoograte.

L. R.

WALKER (Ernest Linwood). **Contributions to the Bacteriology of Leprosy. I. The Diphtheroid in Leprosy.**—*Amer. Jl. Trop. Med.* 1922. July. Vol. 2. No. 4. pp. 293–303.

Bacteriologists are still very sceptical whether the *Bacillus leprae* of HANSEN has ever been cultivated. The successes reported by competent workers are of two types: (1) partly acid-fast diphtheroids

FIG. 1.

FIG. 2.

X ray photographs of left foot (fig. 1) and right hand (fig. 2) of two cases of anaesthetic leprosy. (DELAMARE & CHUKRI.)

[Reproduced from *Bulletins et Memoires de la Société Médicale des Hôpitaux de Paris.*]

first cultivated by BORDONI-UFFREDUZZI in 1887, and 16 times since by other observers up to 1914; and (2) the chromogenic acid-fast bacilli first cultivated by CLEGG in 1909. The present paper deals with the first group as obtained by cultures from nasal and dermal ulcers of lepers at San Francisco, and a few incisions of nodules. The sterile swabs were rubbed up in a little saline and three dilutions made in glycerinated veal broth agar and any diphtheroids transplanted on to glycerine agar. In 164 cultivations from 16 lepers, which were incubated sufficiently long, four types of diphtheroids were obtained in the following proportions: 26, 61, 12 and 26 respectively. The first group was the well-known pseudo-diphtheria bacillus of HOFFMANN; the second most common type was not acid-fast, nor was the third, which only differed slightly from the second, neither apparently having been fully described before. The fourth group was acid-fast and presented characteristic colonies with extreme pleomorphism and partial acid-fastness of BORDONI-UFFREDUZZI and subsequent workers. It has only been obtained from the noses of advanced nodular or mixed cases of leprosy showing many acid-fast *Bacillus leprae* in the nasal secretions, while it was absent or very scanty in cases in which long treatment with esters of chaulmoogric acid had produced great improvement with diminution or disappearance of acid-fast bacilli from the nasal secretions.

Having thus confirmed those who had previously cultivated such organisms from leprous lesions, Walker sought to discover a possible saprophytic source for this diphtheroid as bearing on its parasitism an etiologic relation to leprosy. In this connexion he studied the smegma bacillus, and found that cultivations from smegmal secretion yielded only colonies of staphylococci and a diphtheroid of extremely pleomorphic acid-fast nature, frequently showing acid-fast granules and segments, which appeared to be the only diphtheroid in smegma preputii able to grow on glycerine agar. It presented cultural, morphological, biochemical and tintorial characteristics which are apparently identical with those of the diphtheroid cultivable from the lesions and organs of lepers and considered by some to be the cultural form of *B. leprae.*

L. R.

MARCHOUX (E). **La lèpre du rat est peut-être transmissible à l'homme.**—*Bull. Acad. Med.* 1922. May 16. 3rd Ser. Vol. 87. No. 20. pp. 545-547.

Last year Marchoux described a bacillus obtained from a young Haitian with an affection taken for leprosy, an acid-resistant bacillus, which he considered to differ from those of HANSEN and KOCH, and called provisionally *Mycobacterium pulviforme* [see this *Bulletin*, Vol. 18, p. 407]. He now reports having infected white rats by the injection of the spleen-pulp rich in the bacteria, some of the animals dying with acid-fast bacilli at the site of injection, in the neighbouring glands and in connective tissues with undoubted multiplication of the organisms, while on passage into another rat more extended lesions were found. He therefore asks if the original patient could have been accidentally infected with rat leprosy, but he considers that the evidence proves only that there exists in man a disease resembling leprosy and caused by an acid-fast bacillus which is transmissible to white rats.

L. R.

Gomez (Liborio), Basa (Jose Avellana) & Nicolas (Catalino). **Early Lesions and the Development and Incidence of Leprosy in the Children of Lepers.**—*Philippine Jl. Sci.* 1922. Sept. Vol. 21. No. 3. pp. 233–256. With 6 plates.

This is an interesting account of the early lesions of leprosy in children born of leper parents in the Culion Colony of the Philippines, where " the immense majority of the children born of leper parents were permitted to live with them and among other lepers " ; a lamentable state of affairs. Between 1906 and 1921 inclusive, 689 children were born, 333 died, 51 were sent away from Culion, 3 returning later, and at the end of 1921, 308 were living in the colony, both parents of practically all having been lepers, the majority living among lepers, while a limited number were isolated in a healthy children's house after having been in intimate contact with lepers for varying lengths of time. During nine months repeated clinical and bacteriological studies have been made of all the children in the colony, with the following results.

The mortality among the children under 1 year has been high, 42 per cent., or practically the same as in Manila, but more died of debility and less from infantile beriberi, owing to only unpolished rice being used. Bacteriological examinations of the skin lesions and of the nose in early cases in the children showed definite lesions in the septum in all positive nasal examinations, while every one of them also gave positive skin examinations. Of 24, however, with positive skin lesions, only 13 gave positive nasal findings, which is greatly against Sticker's theory that the nose is the seat of the primary lesion of leprosy.

The earliest lesions were smooth, level, irregularly shaped, whitish fawn-coloured maculae, most frequently on the trunk, buttocks, thighs, arms and face, which in their early stages show no loss of hair, sweating, or sensibility to touch or temperature. Older patches develop a reddish tint, when lepra bacilli are first found, and distinction between heat and cold is lost, followed by that of touch, loss of sweating and of hairs, etc. Another early sign is a shiny and flushed appearance of the legs, with or without the white patches. Anaesthesia was usually first noted on the peroneal side of the leg and ankle and the ulnar side of the forearm and back of the elbow. There was no clear history of bullae formation, which Dyer and Gwyther considered to be one of the first manifestations of leprosy. Gradual thickening with the increase of the bacilli produce the typical lesions of leprosy, the purely macular lesions being mostly seen in the younger and infiltrations in older children. Both may be illustrated in brothers and sisters. In four children bacteriologically negative patches disappeared later, and once this occurred with a bacteriologically positive case.

The effect of segregation on the development of the disease has also been studied in the case of 83 children born in the colony and isolated in a house for the healthy at ages varying between a few months and 8 years, up to which they were exposed to infection ; 25 had died, 5 had been transferred from the colony, 22 remained negative, and 26 were returned for leprosy or suspicious signs of the disease. Of the latter, after repeated examinations, 4 were found not to be lepers, while of the remaining 22 with signs of the disease 11 were bacteriologically positive and 11 negative, to which are added 2 children

returned to the colony with leprosy, the data regarding the whole 26 cases being shown in Table 4.

TABLE 4.—*Children isolated at the Negative Children's House as non-lepers and later returned to the Colony on account of definite or suspicious signs of Leprosy.*

[(+) Positive clinically and bacteriologically.]

No.	Initials.	Date of Birth.	Age on January 1, 1922.	Age when isolated.	Age when definite or suspicious signs of leprosy developed.	Period of isolation.
			y. m. d.	*y. m. d.*	*y. m. d.*	*y. m. d.*
1	J. R. (+)	Mar. 30, 1911 ..	10 9 1	5 1 26	5 5 25	0 3 29
2	A.T. (+)	Feb. 19, 1910 ..	11 10 12	6 4 28	6 11 13	0 6 15
3	P. I. (+)	June 25, 1914 ..	7 6 6	1 9 0	2 6 7	0 8 7
4	B. R. (+)	June 14, 1914 ..	7 6 17	2 1 3	2 10 (?)	0 9 0
5	E. S. (+)	Sept. 8, 1911 ..	10 3 23	4 10 19	6 (?)	1 2 (?)
6	R. N.(+)	Oct. 17, 1911 ..	10 2 14	4 5 12	5 8 13	1 2 2
7	F. A. ..	Jan. 20, 1919 ..	2 11 11	1 4 0	2 7 18	1 3 18
8	A. F. ..	June 13, 1914 ..	7 6 18	1 11 13	3 5 26	1 6 13
9	V. C. ..	Sept. 8, 1913 ..	8 3 23	2 10 9	4 6 25	1 8 16
10	L. de C.	Feb. 20, 1913 ..	8 10 11	3 3 6	5 0 27	1 9 21
11	A.V.S.(+)	Nov. 8, 1913 ..	8 1 23	4 3 12	6 7 10	2 3 16
12	F. R. (+)	Aug. 21, 1916 ..	5 4 10	1 0 7	3 4 25	2 4 12
13	G. D. (+)	April 3, 1916 ..	5 8 28	1 4 24	3 9 7	2 4 13
14	A. N. ..	Aug. 15, 1913 ..	8 4 16	2 7 23	5 5 3	2 5 2
15	A. C. (+)	April 21, 1913 ..	8 8 10	3 2 26	5 8 27	2 6 1
16	L. T. ..	Nov. 11, 1913 ..	8 1 20	2 4 14	4 11 14	2 7 0
17	G. M. ..	Feb. 2, 1915 ..	6 10 29	1 1 19	3 11 16	2 9 17
18	P. B. (+)	July 13, 1916 ..	5 5 18	1 1 15	3 9 3	2 9 18
19	M. L. ..	April 26, 1915 ..	5 8 6	0 10 29	3 8 22	2 9 28
20	M. Z. ..	Jan. 16, 1909 ..	12 11 15	7 10 24	10 11 24	3 1 0
21	J. C. (+)	Feb. 24, 1912 ..	9 10 7	4 4 23	6 7 21	3 2 28
22	M. C. ..	April 14, 1913 ..	8 8 17	2 11 24	7 2 2	4 2 8

This gives the age when isolated, the age when suspicious signs appeared, and the period of isolation, and it shows that from several months to several years may elapse after contact or association with lepers before suspicious or definite signs of leprosy develop.

Table 5 is still more instructive. It gives the data regarding 308 children born and living in association with their leper parents and others at Culion classed according to their ages and condition, whether bacteriologically positive (7·79 per cent.), clinically anaesthetic lepers (6·4 per cent.), suspicious (18·8 per cent.), or entirely negative (66·8 per cent.), thus showing that 14·2 per cent. were lepers and 18·8 per cent. more showed suspicious signs of the disease. As these figures include all the young children, many of whom may be in the incubation period of the disease, the following percentages of definite infection at different ages are also given, namely, 36·8 per cent. in children of 10 to 13 years of age, 12 per cent. in those of 5 to 9 years, and only 2 per cent. in those under 5 years, many of whom are certain to develop the disease later even if now isolated, as shown by the data in the first table. The well-known great susceptibility of children to leprosy is once more brought out by the above data and is emphasized by figures of the first table, which shows that no less than 15 children isolated between the ages of 11 months and 4 years old developed the disease within 8 months to 4 years after separation from their infected parents.

TABLE 5.—*Incidence of Leprosy in the Children of Leper Parents.*

Age in years.	Children examined.			Positive lepers.				Clinical lepers.			
	Males.	Females.	Total.	Males.	Females.	Total.		Males.	Females.	Total.	
							per cent.				per cent.
Under 1 ..	15	17	32	—	—	—	—	—	—	—	—
1	25	17	42	—	—	—	—	—	—	—	—
2	13	15	28	—	—	—	—	—	1	1	3·57
3	25	15	40	1	—	1	2·5	—	—	—	—
4	19	20	39	1	2	3	7·69	5	2	7	17·9
5	9	8	17	1	1	2	11·76	—	—	—	—
6	15	21	36	1	1	2	5·33	1	3	4	11
7	12	12	24	2	1	3	12·50	1	1	2	8·33
8	6	16	22	—	2	2	9·09	1	3	4	18
9	6	3	9	3	1	4	44·44	—	—	—	—
10	5	3	8	2	1	3	37·50	—	—	—	—
11	—	4	4	—	1	1	25	—	—	—	—
12 ..	1	4	5	—	2	2	40	1	1	2	40
13	2	—	2	1	—	1	50	—	—	—	—
Total ..	153	155	308	12	12	24	7·79	9	11	20	6·4

Age in years.	Suspicious.				Negatives.			
	Males.	Females.	Total.		Males.	Females.	Total.	
				per cent.				per cent.
Under 1..	—	—	—	—	15	17	32	100
1 ..	3	3	6	11·904	22	14	36	85·71
2 ..	2	2	4	14·27	11	12	23	82·14
3 ..	9	4	13	32·5	15	11	26	65
4 ..	5	6	11	28·2	9	9	18	46·15
5 ..	2	4	6	35·29	6	3	9	52·94
6 ..	7	3	10	27·7	6	14	20	55·55
7 ..	1	—	1	4·17	8	10	18	75
8 ..	1	4	5	22·72	4	7	11	50
9 ..	—	—	—	—	3	2	5	55·55
10 ..	1	1	2	25	2	1	3	37·5
11 ..	—	—	—	—	—	3	3	75
12 ..	—	—	—	—	—	1	1	20
13 ..	—	—	—	—	1	—	1	50
Total	31	27	58	18·8	102	104	206	66·8

It is to be hoped that these terrible figures will hasten the time when it will universally be considered to be criminally negligent to allow healthy children to live in the same houses as, or come into contact with, actual lepers.

L. R.

ARIAZZI (A.) & PICO (C. E.). **Sobre la reacciòn de Sachs y Georgi. Estudio comparativo con la reacción Wassermann en diversas afecciones y especialmente en la lepra.**—*Rev. Inst. Bacteriolog.* 1920. May. Vol. 2. No. 5. pp. 721–728.

A comparative trial of the Sachs-Georgi and Wassermann reactions in which in 390 of 408 serums tested the two reactions were concordant, a percentage of 95·4. In the 65 leprosy cases the Wassermann was positive in 21, the Sachs-Georgi in 19.

A. G. B.

PERKINS (Granville A.). **Manufacture of Certain Drugs for the Treatment of Leprosy.**—*Philippine Jl. Sci.* 1922. July. Vol. 21. No. 1. pp. 1–14. With 1 plate.

This paper gives a valuable account of the preparation and chemical constitution of derivatives of chaulmoogra oil now being used for injection in the improved treatment of leprosy; it is written from the chemist's standpoint, so is mainly technical. After reference to the widely distributed varieties of Hydnocarpus oils, which contain the same active unsaturated fatty acids as true chaulmoogra oil derived from the *Taraktogenos kurzii* of India, the history of the recent advances, familiar to readers of this *Bulletin*, is dealt with, including the views of WALKER and SWEENEY that the fatty acids of chaulmoogra oil have a direct destructive effect on the lepra bacilli, and of ROGERS that unsaturated fatty acids as a whole are effective in leprosy even when without a direct action on acid-fast bacilli *in vitro*. The various preparations of chaulmoogra oil in recent use are next described, including MERCADO's formula for intramuscular injections of the whole oil, chaulmoogra ethyl esters, for some time used as "antileprol" and recently revived by DEAN and HOLLMAN in Hawaii and by MUIR in his E.C.C.O. mixture for similar use, sodium gynocardate A of ROGERS given intravenously, and sodium and ethyl ester morrhuates of the same worker; such details of the manufacture of each as are of value to chemists are given, especially of the preparation on a large scale of ethyl ester chaulmoogrates, with an illustration of the apparatus used. All the above preparations are now being tested clinically on a large scale at the Culion Colony with its 5,000 lepers, ethyl ester intramuscularly being the main routine treatment, and the results of this crucial trial will be awaited with great interest. In conclusion the writer states that the "success recently obtained in the treatment of leprosy and tuberculosis with drugs derived from certain oils is encouraging, not only in itself but also in the prospect for improvement that it promises. If WALKER's idea of the absorption of toxic fatty substances by acid-fast bacilli is correct, it should be easy to make in the laboratory a much more effective drug by properly combining a toxic element like arsenic or antimony with a fatty acid. If ROGERS's idea of the efficacy of unsaturation in general proves to be correct, oils may be used that are much more unsaturated than chaulmoogra oil."

L. R.

DEAN (Arthur L.). & WRENSHALL (Richard). **Preparation of Chaulmoogra Oil Derivatives for the Treatment of Leprosy.**—*Public Health Rep.* 1922. June 9. Vol. 37. No. 23. pp. 1395–1399. With 1 text fig.

The method used in Hawaii in making ethyl esters of chaulmoogric fatty acids from both Hydnocarpus and Taraktogenos oils of a similar chemical composition is described. They are distinguished from all others by their power of rotating the plane of polarized light, the more valuable oils showing specific rotations around + 50°, which is a reliable test of the quality of the oils irrespective of their appearance. For the details the paper must be consulted.

L. R.

Morrow (Howard), Walker (Ernest L.) & Miller (Hiram E.). **Experience with Chaulmoogra Oil Derivatives in Treatment of Leprosy.**—*Jl. Amer. Med. Assoc.* 1922. Aug. 5. Vol. 79. No. 6. pp. 434–439. With 10 figs.

The writers report their experience of the treatment of advanced lepers in the San Francisco hospital, which was at variance with the expectations they had formed from recent reports from other countries, a brief history of which they give. They began the treatment of 10 nodular, 6 maculoanaesthetic and 5 mixed cases in August, 1920, the average duration of the disease being 4½ years and varying from 2 months to 13 years, and the period of isolation averaging 3 years; weekly intramuscular injections of ethyl ester chaulmoograte were given. Laboratory investigations showed that butyl and propyl esters produced much less local pain, while in two cases treated with these preparations alone the results were as good as in the others. The duration of the treatment was 3 to 18 months. The results were as follows: 1 boy died of leprosy and 1 man of 71 of pneumonia after the leprosy was better; 3 advanced cases got worse; 9 showed no improvement; 2 cases of moderate severity improved markedly, and 3 similar cases improved slightly; 2 early cases absconded after three months' treatment.

In view of these poor results one of the authors visited Hawaii and saw all the cases there, including the early ones in the Kalihi hospital, and ascertained that between 1918 and July, 1921, 150 patients had been paroled, of whom 10 at least had died and a few had gone to other parts of the islands, while 20, or 8 per cent., had returned to the hospital for treatment of recurrences of the disease. Weekly injections are now being given to paroled cases for two years. At the Molokai settlement, during 1921, 300 of the 452 patients were treated with the ethyl ester, but, as no cases have been sent to Molokai since 1919, there are very few early cases among them. Few, if any, of the 300 patients yet show indications of early parole, although Dr. Goodhue hopes to see many of the milder cases cured. Heiser and many others agree that the esters are by far the best of the present chaulmoogra oil treatments and will probably cure early cases after years of treatment and also a very small percentage of a fairly advanced stage. In the San Francisco hospital the aged and advanced cases proved unfavourable, but in the few early cases the authors were satisfied that the remedy is of great value. It should, however, be continued for three years in mild and much longer in advanced cases.

L. R.

Fowler (Henry). **The Modern Treatment of Leprosy.**—*China Med. Jl.* 1922. Mar. Vol. 36. No. 2. pp. 115–118. With 4 text figs.

Although over-optimistic statements have been made in the lay press regarding the ethyl ester chaulmoograte treatment, yet in properly selected cases, especially in the young and those in the early stages, clinical improvement is rapid and striking, but the results are less favourable in older persons and cases of long duration. It cannot yet be said whether actual cures will result, and in arrested cases some relapses must be expected, as in tuberculosis. Up to the present 8 per cent. of those paroled in Hawaii have relapsed and returned for further treatment. Apparent cures have been obtained in a considerable number of cases; time is required to say if they are permanent

or not, but a hopeful advance has been made. Supplies of the drug are now being made at Calcutta, at the Government laboratories at Seoul, at Honolulu (and in the Philippines), and at the Pekin Union Medical College in China. An English and an American firm have made efficient supplies, but their cost is prohibitive for hospital use on a large scale.

L. R.

Bloch & Bouvelot. **Emploi de l'huile de chaulmoogra et de ses dérivés dans le traitement de la lèpre.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1921. Apr.–May–June. Vol. 19. No. 2. pp. 181–188.

The authors first refer to the early favourable results obtained with the ethyl ester of chaulmoogra oil in the form of "antileprol" by Biccardi (*Lepra* 1911, p. 211), by Serra (*Lepra* 1913, p. 63), and by Engel Bey mainly by oral administration, and to the work of Rogers with gynocardates and sodium morrhuate, all previous to the work of Dean and Hollmann, and then describe the well-known method of preparation [see the paper of Dean & Wrenshall above].

The present writers have given weekly intramuscular injections of from 1 to 5 cc. of the ethyl ester and found it especially efficacious against nodular cases. They have also obtained remarkable results in the usually resistant nerve form, and they noted the usual febrile and local reactions succeeded by retrogression and absorption of the lesions, which also follows direct injection of the remedy into the nodules themselves. In about 10 per cent. the febrile reactions were accompanied by a fresh crop of transient raised red patches. They have obtained notable improvement in all their cases, and often cures.

L. R.

Nicholls (Lucius). **Treatment of Leprosy.** [Correspondence.]—*Brit. Med. Jl.* 1922. Nov. 4. p. 892.

It is pointed out that nastin and other preparations have been lauded for a time as cures of leprosy and the writer knows of medical men who have failed to get good results with gynocardates. Muir's E.C.C.O. mixture was tried for many months in the Ceylon Leper Asylum and careful records were kept, but the results were very disappointing, and he wishes to direct attention to the following points: (1) that many cases undergo a natural recovery in the early stages; (2) most of the lepers segregated in asylums are in the later stages [in India about three-fourths of asylum cases are old, mutilated, anaesthetic cases in whom no material effect from treatment is possible]; and (3) the disease waxes and wanes and natural cures are more common than is thought.

L. R.

Harper (P.). **The Treatment and Prognosis of Leprosy.**—*Brit. Med. Jl.* 1922. July 8. pp. 39–40.

Further experience in Fiji is recorded. Good and abundant food, including milk, open-air life, gentle exercise and daily baths and amusements are advocated; while surgical measures, including

exposing the length of thickened nerves and peeling the epineurium from the inflamed nerve, are of value. Among medicinal treatments he has tried : (1) tartar emetic intravenously up to totals of 43 and 46 gr. without any resulting improvement ; (2) ethyl ester chaulmoogrates intramuscularly, which he found expensive, very painful and not as effective as 3 and 5 below ; (3) sodium hydnocarpate orally and intravenously, which is better than the foregoing, but not so good as method 5 ; (4) HEISER's chaulmoogra oil formula intramuscularly, which is painful and causes fibrous degeneration of the muscles, but is nevertheless valuable ; and (5) intravenous injections of crude chaulmoogra oil sterilized by heat given at blood temperature in doses of 5 to 15 minims one to three times daily, with two weeks' rest after four weeks' treatment. This is continued until a reaction occurs, during which treatment is stopped, febrile and local reactions being followed by improvement, but the treatment must be continued for years. In early and mild cases there is fair hope of cure or arrest of the disease. Most lepers die of intercurrent diseases, the causes of death in 157 cases at Makogai having been : tuberculosis 42, septic infection 31, nephritis 18, leprosy 14, exhaustion 5, tetanus 4, senility 3, pneumonia 3, dysentery 3, suicide 3, amyloid disease 2, and 20 different intercurrent diseases in the remaining 24 cases.

L. R.

ROBINEAU. **Le traitement de la lèpre dans les léproseries d'Ebolowa (Yedang-Ngalan) au Cameroun.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1922. Jan.–Feb.–Mar.–Apr. Vol. 20. No. 1. pp. 22–36.

After mentioning some of the older remedies for leprosy, the writer gives tables showing the results of treatment of a number of cases with : (1) intramuscular injections of 1 to 2 cc. of chaulmoogra oil, 50 cases being treated without febrile reactions or abscesses ; after three months the results were encouraging ; (2) intramuscular injection of the following chaulmoogra-alcohol-ether mixture—chaulmoogra oil 150 gm., 95 per cent. alcohol 30 gm., and sulphuric ether 35 gm., the mixture being passed through filter-paper and protected from evaporation. Of 43 macular cases treated for four months, 33, or 76·7 per cent., showed notable improvement and five no change, but the supply ran out just as the results became interesting. Arrhenal-atoxyl intramuscularly was next tried, as a case of sleeping-sickness in a leper had shown improvement in the leprotic lesions under this treatment. Weekly injections of 0·1 gm. atoxyl and 0·05 gm. of arrhenal in 2 cc. water were given in 77 lepers, from 20 to 50 injections in each without any ocular reaction or intoxication, and they conclude by expressing the hope that this method will give satisfactory results. Later, they also used intramuscular injections of d'aiouni-eucalyptol,* but as all three lines of treatment were used one after the other in the great majority of the cases shown in the tables, many of which improved in variable degrees, it is not possible to draw any safe conclusions regarding any one of them, although they think the value of the chaulmoogra oil preparation seems to be demonstrated.

L. R.

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* Aiouni is chaulmoogra oil prepared by Alf. Cousin, at Lausanne.

HASSON (James). **Traitement de la lèpre tubereuse par l'amino-arseno-phenol (132).**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1922. Oct. 26. 3rd Ser. Year 38. No. 28. pp. 1356–1361.

This arsenical preparation, which is called eparseno for short, was given intramuscularly in large doses to 17 nodular lepers, 15 of whom had previously been treated by injections of various chaulmoogra oil preparations. The cases were seen at Alexandria and came from Egypt and the Sudan, and the injections were made in the buttock in both hospital and out-patients, one ampoule daily during the first week and then two daily for 10 to 15 days according to the tolerance of the patients ; after an interval of 10 to 15 days a second series of two to three ampoules daily for seven to eight days, careful observations being made on the urinary elimination and the general tolerance to arsenic. The results showed a sensible amelioration by the third week, the lesions became reduced and disappeared usually by the fifth to sixth week, only two cases resisting the treatment up to the tenth week, when four series of 10 ampoules had been injected. In anaesthetic cases the nerve symptoms only receded very slowly, but in a nodular case in a child of 11 years the lesions disappeared completely in one month. After the first series of injections the lesions were often aggravated with congestive reactions and even ulceration with a slight rise of temperature, but this was followed by amelioration and recovery of sleep and appetite. The complement fixation test was positive with antigens made from lepromes before the treatment, but generally negative after, sometimes as early as the third week. He concludes that the results of the intensive treatment by this drug were better than those obtained with chaulmoogra oil preparations.

L. R.

GOUGEROT. **Traitement de la lèpre par l'aminoarsenophenol (eparseno).** —*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1922. Nov. 2. 3rd Ser. Year 38. No. 29. pp. 1379–1382.

Three cases of leprosy treated with this drug are reported :—

1. A South American, aged 37, with nodular leprosy for 12 years unsuccessfully treated by Hollmann and Dean's method. He was given eparseno for two months in weekly doses of 1, 1·5, 2 and 4 cc., the first three injections being followed by febrile and local reactions and subsequently by progressive slow lessening and absorption of the lesions. After a rest of 15 days a second course was given and all the lesions completely disappeared, leaving only pigmented macules.

2. Received 17 cc. in 11 injections given twice a week, when arsenical vesicles appeared and later boils, but the leprotic lesions disappeared after eight injections, and a clinical cure resulted.

3. A patient, aged 59, with symptoms beginning in May, 1919, and continuing in spite of chaulmoogra oil treatment. Eparseno was injected in 1 cc. doses every other day, and as pains increased the same dose was given every third or fourth day up to a total of 12 cc., when the lepromes were already half absorbed ; the treatment was resumed after eight days' rest up to 19 injections, when the lepromes were absorbed, only pigmentation remaining. These three cases, taken with the 17 cases of HASSON (see above) and the regularity of the reactions and results make him hopeful that eparseno will rapidly efface the lesions of leprosy.

L. R.

CAWSTON (F. G.). **Antimony and Sulphur in the Treatment of Lepers.** —*Jl. Trop. Med. & Hyg.* 1922. Nov. 1. Vol. 25. No. 21. pp. 345–346.

In the Basuto leper asylum colloidal antimony and sulphur have been tried with some improvement in the temperature of two acute cases, but a series of 11 injections containing 8½ gr. of tartar emetic gave disappointing results. MACFIE, on the Gold Coast, treated one leper for 7½ months with injections of oscal stibium totalling 52 cc. with considerable improvement. Sulphur counteracts the metallic poisoning caused by colloidal antimony alone.

L. R.

BARBER (H. W.). **Case of Nodular Leprosy.**—*Proc. Roy. Soc. Med.* (Sect. of Dermat.) 1922. Sept. Vol. 15. No. 11. p. 48.

ITO (Shiro). [**Efficacy of the Ester of Chaulmoogra Oil in Leprosy.**]— *Iji-Shimbun (Med. News).* 1922. Apr. No. 1092. [Summarized in *Japan Med. World.* Tokyo. 1922. Oct. 15. Vol. 2. No. 10. p. 297.]

LEGER (Marcel) & NOGUE (Maurice). **Mycose à *Scopulariopsis* chez deux malades ayant des lésions cutanées rappelant la lèpre.**—*Bull. Soc. Path. Exot.* 1922. July 12. Vol. 15. No. 7. pp. 654–661. With 3 text figs.

PARRA (Ricardo F.). **Tratamiento de la lepra en Agua de Dios (Nota preliminar).**— *Repert. de Med. y Cirug.* 1922. Mar. Vol. 13. No. 6. (No. 150.) pp. 306–311.

ROGERS (Leonard). **The Spread, Probable Mode of Infection, and Prophylaxis of Leprosy.**—*China Med. Jl.* 1922. Nov. Vol. 36. No. 6. pp. 474–486.

YORKE (Warrington) & ADLER (S.). **Note on a Case of Leprosy.**—*Ann. Trop. Med. & Parasit.* 1921. Sept. 30. Vol. 15. No. 3. p. 269. With 1 plate.

REVIEWS AND NOTICES.

ROGER (G. H.). **Physiologie normale et pathologique du foie.**—398 pp. With 16 charts in text. 1922. Paris: Masson et Cie, 120, Boulevard Saint-Germain. [Price 22 francs.]

The author is well known by his numerous published researches on the liver, and the present volume is a welcome one. It treats of the numerous functions assigned to the organ, in reference to bile formation and metabolism. This is followed in each case by a description of deviations from the normal. Thus, disorders of the circulation follow on a description of the normal blood flow through it, jaundice of various kinds follows the physiology of bile formation, diabetes—the account we have of its glycogenic function—and so forth. The book is not written from the point of view of the student of tropical diseases, but much of such questions is naturally included, and the whole is eminently readable. The book unfortunately lacks an index, and would have been much more valuable had a bibliography been appended as well. The only literature quoted consists of M. Roger's own writings. It is interesting to note how much we are indebted to French writers, and their names, from Claude BERNARD onwards, are frequently alluded to but without any reference to their publications. This limitation narrows considerably the outlook of the book. To take an instance, one which specially appeals to the reviewer, the influence of the liver on blood-coagulation; the data presented are nearly all due to the work of the author's French colleagues. Without denying the importance of their point of view, the subject would have been much more complete, and probably the conclusions would have been different, if the recent work of American and English investigators, which has seriously questioned whether the liver is really responsible for the elaboration of antithrombin and other theoretical substances, had been also considered.

W. D. Halliburton.

NICOLLE (M.) & MAGROU (J.). **Les maladies parasitaires des plantes (infestation—infection).**—199 pp. 1922. Paris: Masson et Cie, 120, Boulevard Saint-Germain. [Price 8 francs net.]

This little book is planned on somewhat original lines with the expressed purpose of providing medical pathologists and parasitologists with a general survey of pathological processes in plants. The need for a knowledge of the parasitic diseases of higher animals is already recognized by pathologists. To acquire a wide outlook on fundamental problems of virulence, immunity, reaction to infection, and the like, the authors hold that it is impossible to neglect the study of the diseases of lower animals and above all of plants, and they declare "Pas de Médecine générale, si l'on ignore ce qui se passe dans le monde végétale."

The work is divided into sections dealing with the diseases of plants due to insects, mites, and nematodes (44 pp.); to phanerogams (12 pp.); to thallophytes (55 pp.); and to bacteria (31 pp.); besides a general survey of 24 pp. at the end. Obviously within such narrow limits of space it is not possible to present more than the barest outline of the subject. From the mass of material available only such cases have been selected as are specially important or instructive in illustrating pathological processes in plants. The characters of the parasites are but incidentally touched on, symptoms and mechanism of infection are more fully discussed. Each section terminates with a survey of the processes of parasitic action within the group (penetration, infection, toxic action, virulence, and the like), resistance of the host, influence of external conditions, and general outline of treatment.

The final section seeks amongst the variety of appearances the few fundamental processes. This part of the book suffers more than the rest from over-condensation and a certain timidity of presentation which results from an insufficient discussion of the evidence. Thus the case for toxic action on the tissues at a distance from the seat of the parasitic lesion is left somewhat hypothetical, though it is fully proven in, at any rate, a certain number of instances. Much more is known regarding the means of resistance to parasitic attack made use of by plants than the short generalized statement on page 187 would imply, though we may agree that most of the causes of natural immunity are still obscure. There is scarcely any mention of the very important work of recent years in the Mendelian inheritance of resistance and susceptibility to disease in plants, though the subject cannot but have a bearing on the nature of immunity. The extraordinarily close relationship between the environment, especially temperature and humidity, and certain cryptogamic diseases of plants is only hinted at, though it is of much significance in comparative pathology. The plan of this section of the book provides an excellent framework for the discussion of most of the features of disease in plants likely to be of interest to comparative pathologists, and it is greatly to be regretted that the self-imposed limitations of space have prevented an adequate presentation of the subject, which one feels the authors could so well have accomplished.

The descriptive part of the work has been clearly and carefully written and shows a commendable caution in accepting only fully substantiated work in almost all cases. Errors of fact are rare, which in view of the wide field covered, the few good modern textbooks of plant diseases, and the great strides made in our knowledge of such diseases in recent years is no mean feat. Whether so brief an outline can really fulfil the authors' purpose is doubtful, but at least it should stimulate interest in the pathological processes of plants amongst pathologists in other fields, and perhaps encourage them to acquire for themselves a further knowledge of the subject.

E. J. Butler.

STANNUS (H. S.). **The Wayao of Nyasaland.**—Reprinted from *Harvard African Studies*, Vol. III. Varia Africana III. pp. 229–372. With 23 plates. Peabody Museum of Harvard University, Cambridge, Mass., U.S.A.

The author of this fine ethnological study was stationed for several years at Zomba in the Shiré Highlands of Nyasaland, and he gives us here a methodical record of his own observations of the natives of that vicinity—the Amachinga Yao, a section of the Wayao, a Bantu-speaking people whose cradle is uncertain. His ample survey of these natives includes the life history of the individual with all its critical formalities; their complicate family relationships; their formidable catalogue of diseases, and their treatment; their poisons, witchcraft, ordeals, magic, and divinations; their religious beliefs and their superstitions; their proverbs and stories; their housing, utensils, foodstuffs, and clothing; their decorative art, musical instruments, songs and dances; their warfare, hunting, fishing, and their traps; and their games and amusements. We cannot here deal with the matter of the author's studies, but must applaud the unprejudiced spirit in which they have been presented. For it is evident that the indigenous customs and practices are here regarded, not as crude abominations to be effaced by all the apparatus of theology, but as a native growth more or less adapted to the circumstances, and not so inconceivably remote from the standards of Christian ethic as to be utterly and entirely incapable of some closer adjustment to those standards. The author also, like observers elsewhere, sees the danger to the younger generation of a mere doctrinal emancipation from the old traditions and restraints.

The book is well printed and finely illustrated, but in its present form, as a reprint, it suffers badly from the complete absence of all the usual investure of a book, namely, a title-page, a table of contents, a sufficient explanation of the plates, an index, and the subdivision of the text into chapters.

A. Alcock.

DAVID. **Vade-Mecum à l'Usage des Infirmiers et des Assistants Médicaux-Indigènes.**—214 pp., interleaved. 1922. Vromant & Co., Imprimeurs-Editeurs, 3, rue de la Chapelle, Bruxelles. [Price not stated.]

This little book is meant for a class of men corresponding to the Indian Hospital Assistants. It is not intended to be a substitute for teaching, but is to be used as a notebook for ready reference to things within the knowledge and competence of the professional subordinate and intermediary between the European doctor and the native patient. Written in simple language, and furnished with a sufficient index, it admirably answers its purpose. A few pages of introduction impart the essence of the Hippocratic tradition. Then follow in orderly arrangement the elementary facts of anatomy and physiology; and then comes a general survey of the causes of disease and the meaning of infection, the management and observation of the sick, the various methods of administering remedies, the principal remedies in common use, the special features of the commoner diseases, and some elements of hygiene and prophylaxis. Minor surgery in all its aspects and apparatus and exigencies comes next, occupying nearly a third of the book. Then there is a section on certain specific diseases and infections particularly rife among the inhabitants of Congo, and, finally, a few pages on obstetrics and the hygiene of infancy. The material is all good, but perhaps its arrangement could be improved.

A. Alcock.

PEKING. **Contributions from the Peking Union Medical College, Peking, China.** 1921. Vol. 1. pp. vi + 316. With numerous plates & figures.

The contents of this collection include papers by FAUST on the Parasites of Vertebrates, on the Intestinal Parasites of Man in the Central Yangtze Valley, on the Excretory System of *Cercaria pekinensis*, on the Schistosome Problem, on South African Larval Trematodes, and on the Trichomonas of Man and of the Guinea-pig; papers by MAXWELL on Intestinal Parasitism in South Fukien and on Filariasis in China; a paper by HAN and YOUNG on Agglutination following injections of T.A.B. vaccine, and two serological papers on kala azar by SIA and HSIEN WU; a paper on experiments with toxicity of antimony by KORNS; papers on analytical investigations of Chinese foods, by EMBREY and TSAN CHING WANG; several descriptive papers on details of human and comparative anatomy; a paper on the bacteriology of smears from eye cases by PA TA CHIH; and several papers on clinical and historical subjects. All of the papers have already been published in well-known journals.

A. Alcock.